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FOLIAR PERIODICITY IN CEYLON.

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THE subject of foliar periodicity in the tropics is of especial interest (*a*) in virtue of the assistance it gives to the study of the histological differentiation of the secondary xylem, (*b*) in consequence of the plants having less resistance than in temperate zones, and (*c*) because erroneous conceptions of the scarcity of deciduous tropical trees exist in the minds of many botanists.

The high temperature and humidity of the air in most parts of Ceylon is such as to allow nearly continuous growth of the arborescent vegetation. In consequence of this, there is no period analogous to the winter of a temperate zone when almost every species becomes leafless and remains so until the spring time arrives. The majority of the trees in Ceylon are of an evergreen nature, and even in the deciduous forms there is considerable irregularity in the periodicity of leaf fall and production.

Deciduous Trees.—In Ceylon, there is no relationship between deciduous and allied species. The same genus may or may not contain deciduous species, or as in the genera Terminalia, Ficus, Sterculia, Stereospermum, and many others, there may be a very large percentage of the species deciduous. Some natural orders, as for instance the Sapotaceæ and Ebenaceæ, are peculiar in that only one or two species are other than evergreen, and not a single natural order can be quoted which has a high percentage of deciduous species. Neveretheless, though this investigation is quite young, I have obtained nearly *200 species* of Ceylon trees which pass through a deciduous phase at recurring periods of time. It is worthy of note that though different specimens of the same species show every variability in the period of time at which they drop their leaves and produce new foliage, yet the same tree passes through this phase at exactly corresponding times from year to year.

In studying the behaviour of our deciduous trees the most usual conclusion is that no law and order prevails, and any tree drops its leaves how and when it chooses. There are, however, certain features which point to a climatic response, and others which indicate that the personal or interval forces are the chief agencies at work. It can be definitely stated that the majority of our deciduous species show a response to climate, in so far that they do, in climates similar to that prevailing at Peradeniya, drop all their leaves and remain leafless during our hottest and driest season. This hot dry period extends from January to April or May, and the leafless trees of Bombax malabarium, D.C., Eriodendron anfractuosum, D.C., Spondias mangifera, Willd., Stereospermum chelenoides, D.C., Ficus Arnottiana, Mig., Derris robusta, Benth., Careya arborea, Gaertn, Ficus religiosa, L., Crataevæ Roxburghii, Br., and very many other species, give a characteristic barren appearance to the arborescent vegetation. Very many species undergo defoliation, and this does not occur during the dry part of each monsoon but only during the time stated. The deciduous trees seem, therefore, only to recognise one hot dry period of three to four months as against the alternating dry and wet months of the remainder of the year. Further, every tree of Terminalia Catappa undergoes a complete change, of leaf during the dry part of each monsoon, and other species, I suspect, undergo foliar repletion twice every year. In addition to these we have some species, not native, which though they drop all their leaves and regain complete foliage at one time of the year, also suffer partial falls and productions at other times of the year. Pithecolobium Saman, Benth.; Stereospermum chelenoides.

Instances of acclimatisation are well known, but there are also some species which do not appear capable of readily accommodating themselves and

drop and produce leaf during any month of the year. This is characteristic of Cedrela Toona, Roxb., planted in the upcountry and a native of Australia.

There are some species which though in the Peradeniya districts are quite deciduous, yet in the more equable climate of Java are quite evergreen.

That the climate of Ceylon has a decided influence on the periodicity of the deciduous species is obvious if one leaves the Peradeniya district in May and proceeds to the Northern parts of the Island where there is very little rain in the S. W. monsoon, and where the weather from January to October is relatively dry and hot. The defoliation and foliar repletion has been considerably delayed in the Vavoniya and Mannar disiricts compared with Peradeniya, the species common to all districts dropping their leaves at times which differ by many weeks and months. In the northern districts so long as the plant drops its leaves during any of the eight or nine months, the same climatic advantages, if any, will accrue.

It may therefore be concluded that the variation which occurs in the temperature and humidity of the air in Ceylon is so great that it exerts a decided influence on the phenomenon of defoliation of many of our species. The climatic conditions in Ceylon are not equable enough to allow the plants to continue their development along a chance line, and botanists desirous of studying the personal equation of plants should select a more equable area.

Personal Equation.—Though the climatic effects are obvious on many of our species, there are several trees which behave in a manner indicative of personal or interval factors being at work.

Many species drop their leaves and regain full foliage at a time which appears decidedly disadvantageous. Many retain full possession of their foliage or put forth the whole of the young tender leaves at a time when the physical conditions favour maximum transpiration. These species may be less plastic to the climatic forces, or it may be that they can achieve their ends in opposition to still more severe external forces.

If one selects trees of Lagerstrœmia flosregina, Retz; Bridelia retusa, Spreng; or species of Canarium or Palaquium, he will find that though they exist alongside each other under conditions which are physically identical, yet the time of fall of old leaf, production of new leaf and of flowers differs considerably in specimens of the same species. In the first mentioned species, the variation is a question of months, and to see members on the same plot, dropping their leaves when others are quite bare, others in full old leaf, and others in full new leaf and flower impresses one with the significance of the internal forces.

Again there are species which undergo defoliation at approximately the same time of the year though they are under very dissimilar climates, and one is led to infer that foliar periodicity is inherent and asserts itself no matter what external forces are at work. Many species drop their leaves and remain bare during a period of wet cool weather when the transpiration is probably at a minimum. This occurs at Peradeniya with trees of Albizzia procera, Benth., and Pterocarpus echinatus, Pers; during the dull moist months of June and July. The periodicity would here appear to be inherent, though there is the possibility that these plants have, in the migration of species, found themselves at a place where the climate is not in harmony with their original periodicity.

The feature which impresses a resident in Peradeniya is undoubtedly the great irregularity in the foliar periodicity of the different trees. It would be very difficult to draw general conclusions as every tree has its own peculiaritie. There is not a month in the year when all the trees are in ful foliage, and this can only be explained when we possess a better knowledge of the internal forces at work in every species.

The most important point, however, rests in th fact that many of our markedly deciduous tree at Peradeniya and still more so in the northern districts of Ceylon, remain bare only for a part of the hot dry, season, and perhaps when the temperature and dryness of the air is at the maximum they burst out into full tender foliage. The output of leaves at any time necessarily occasions increased transpiration, but when this occurs at our hottest and driest time the transpiration is probably at the maximum. It is therefore very difficult to correlate the deciduous phase with the theory of checking transpiration in every instance, and in these cases we must look for other forces which are probably internal. *e g.*, Stereospermum suavolens D.C., Spondias mangifera, Willd., and Aziadirachta indica, A. Juss. We will now proceed to discuss the significance of foliar periodicity and the assistance it gives towards a true interpretation of the histological differentiation of the secondary xylem.

Complete defoliation and foliar repletion usually results in the differentiation of rings of growth in the wood of the stem. In temperate zones the phenomenon is annual, and when such is the case, each ring of growth represents one year of time.

In Ceylon and the tropics generally the fall of leaf and production of new foliage is often more than once per year, and is further subject to variations according to the internal requirements of the particular plants. It is therefore obvious that at least a knowledge of the exact periodicity of every species must be at hand before we can interpret the time value of the rings of growth.

For convenience we may first describe the periodicities of trees belonging to the *deciduous* class.

The sapling stage, often including the first few years of the plant's life, is reported to be of continuous growth, but in many species, notably Eriodendron aufractuosum, defoliation occurs during the first year and a ring of growth is presented in the stem. In species where there is no such differentiation the central wood must represent an unknown number of years. In most of our mature trees the foliar repletion occurs once per year, but in others such as Terminalia Catappa, Stereospermum chelenoides, Pithecolobium Saman, it occurs oftener, and each period of foliar activity must needs be represented in the stem. Many trees undergo foliar depletion at irregular intervals of time, probably as a result of successive years of drought or purely personal reasons, and in each case a complete knowledge of the life history of the plant is necessary before the differentiations in the xylem can be explained.

Then again I have seen Portlandia grandiflora completely defoliated by an insect as soon as it came into new leaf, and several weeks were required for a complete renewal to be effected. If my information is correct that this tree undergoes this cycle every year, the rings of growth should be double those of an undisturbed tree of the same species.

Similary there are certain trees of Bombax malabarium at Peradeniya which are completely defoliated by the ravages of the flying foxes which annually visit the district. These animals appear after the trees have completed their annual output of leaves and remain until all the foliage has been devoured ; by this time the other trees of this species are just beginning to drop their leaves and a curious sight is then presented. Those trees which have been defoliated by the flying foxes now burst out into new leaf for a second time that year, and as thi goes on from year to year, a comparison of th rings of growth in the stems of such trees wi those which are never thus defoliated should pro highly interesting. Probably many other trees suff defoliation from like causes and it is obvious th a knowledge of the life history of each plant necessary before the time-value of each ring of gro can be determined.

Now consider the *evergreen* trees. For our purposes an evergreen tree may be defined as one which never becomes even partially bare so long as it is free from disease. There can be no sharp line between trees belonging to tho evergreen or deciduous classes.

The evergreen trees are continually putting on new leaf, and though the older leaves gradually fall off, the nett result is usually an increase of foliage from year to year.

The young trees usually put on new leaves at a successively increasing rate from year, to year, but when mature a regularity in output often asserts itself. In a large number of our species the foliage is added at one or more times every year, and in such *e.g.* Mangifera indica, L., definite rings of growth are produced every year. The output of new foliage leads to an increased transpiration, and this may or may not lead to the differentiation of a ring of growth. The trees which show an annual output of leaves at a particular time are invariably mature and flowers follow in the axils of the new leaves. In young, non-flowering evergreens, however, the foliage is often added in two parts, one in the N.E. and the other in the S.W. monsoon. Evergreens characterised by such a bi-annual foliar periodicity are comparable to the deciduous Terminalia Catappa trees, and the rings of growth in them probably number more than one per year. There are, however, a very large number of evergreen trees which have no fixed foliage periodicity but put on new leaf every week or month of the year. Among these we have several species of Eugenia, Artocarpus and Cinnamomnm, and numerous others, the rings of growth of which, when present, require a deal of consideration before a correct elucidation can be given.

Finally, there are evergreen trees which though they produce a large number of leaves at a particular time each year, are continually putting forth new leaf buds during the remaining months of the year. It is further conceivable under equable physical conditions, for the same tree to change its mode of leaf production from time to time, in which case a knowledge of the personal equation of the plant would be of the utmost importance.

The point which we have to notice is, that, providing there is a special period at which the evergreen or deciduous trees put forward their leaf for the year, this will result in an especial amount of transpiration for that period. This is usually followed by the differentiation of large lumined thin walled tracheal elements, and each ring of growth thus established is a record of past foliar activity.

The tendency is to produce a very distinct ring of growth in those deciduous trees which are bare for very long periods, though this by no means prevents very slow growing evergreens from producing rings of varying significance. There are, however, many deciduous trees which show very poor rings of growth, and on the other hand evorgreen trees with very pronounced rings in the secondary xylem.

This brings us to the other factors which determine the significance, and in some cases, perhaps, the actual formation of rings of growth in our tropical woods.

These factors are

(1) Rate of cambial activity.
(2) Independent effect of a hot dry climate.

RATE OF CAMBIAL ACTIVITY.

An erroneous popular notion exists that in Ceylon the deciduous trees are usually of more rapid growth than the evergeens. This probably has its origin in the fact that the deciduons trees which are most conspicuous are the plentifully distributed members of the Malvaceæ and Euphorbiaceæ which attain enormous dimensions.

No such relationship exists, however, and the rate of cambial activity is of great variation in trees of both classes.

On the one hand the quickest growing tree in Ceylon is Albizzia Mollucana, an evergreen, while quick growing trees such as Melia dubia and Bombax malabarium are markedly deciduous. On the other hand the Sapotaceæ and Ebenaceæ include some of our slowest growing trees and though the majority are evergreen, there are a few which are deciduous; similary slow growing trees in the form of Bridelia retusa, and Crataevæ Roxburghii are decidedly deciduous. Hence no definite relationship exists in this connection.

Nevertheless the rate of cambial activity is an important factor in determining the significance of the rings of growth, and an active meristematic layer is probably the cause of the rings being more prominent in a quick growing evergreen than in a slow growing deciduous tree.

Consider first the rate of cambial activity in the deciduous plants. Here we will consider trees which are decidous at approximately the same time of the year for about the same length of time. Our best examples of quick growing trees are Bombax Malabarium and Eriodendron aufractuosum. In these species the rings of growth are very conspicuous and may measure several inches in diameter.

Crataevæ Roxburghii is a species characterised by a slow rate of cambial activity, and the stem does not attain a diameter of six inches in twenty years. The rings of growth are here very inconspicuous though the tree is bare for four to five months every year; in this species the leaf fall takes place at a remarkably slow rate, the discoloured leafless first beginning to drop on 26th August, though the tree does not become absolutely leafless until the middle of October each year. Similarly the output of new leaf proceeds at a very slow rate, and consequently the rings of growth are inconspicuous.

A complete list of plants can be quoted to show that the significance of the rings of growth in stems of deciduous trees is in proportion to the rate activity of tho vascular cambium, providing other conditions are the same.

Similary with the evergreen trees which put on new leaf during the same months of the year, moderately quick growing trees such as Mangifera indica, show definite rings of growth; whereas our slow growing species Palaquium and Diospyros (trees which sometimes do not exceed a diameter of six inches in 60 years) the rings are very poorly defined.

The importance of the rate of cambial activity is best realised, however, if we compare the rings of a moderately quick growing evergreen and a slow growing deciduous tree, say Mangifera indica and Crataevæ Roxburghii; for though the latter is bare for so very many weeks every year, its insignificent rings cannot be compared with the broad bands in the wood of the former.

The independent effect of climate is very difficult to determine since the significance of the rings of growth is in part a consequence of additional factors, viz., rate of cambial activity and foliar periodicty, which it is impossible to eliminate. The ideal conditions would be, where a hot drought of three or four months is followed by continuous rain for the remaining eight or nine months, and evergreen trees having no seasonal periodicity or a deciduous tree undergoing complete defoliation and repletion in the middle of either period of drought and rain. Trees approximating to the former slass are to be found in certain Cinnamomum species, and of the latter class in Terminalia Catappa, though neither of these nor the climate in Ceylon are in exact accord with the theoretical condition desired.

Nevertheless, an evergreen tree having no fixed periodicity but continually putting forth a regular supply of leaf when subject to such a climate would provide good material for determining the part which a strongly marked climate plays in the

significance of the rings of growth. In the deciduous trees which undergo foliar repletion in the middle of the drought and rainy seasons the rings of growth would probably be more enhanced when produced in the midst of the hot dry season when transpiration was at the maximum.

Allowing that the above results may be logically expected, a number of interesting points crop up for consideration.

In the first place we have to realise that perhaps a definite histological differentiation can be effected in the secondary xylem purely in consequence of the excessive transpiration occasioned by a period of excessive drought, which may be eccentric or recur constantly from year to year.

In the second place, if the time of foliar repletion for any tree coincides with the only hot dry period of the year, as it very often does, the excessive transpiration which will most probably occur will be met by the differentiation of trachcal elements of greater width than those produced during the rest of the year when transpiration is reduced. The reduced transpiration is a consequence of the air being cooler and more moist and the leaves becoming cuticularised. Hence the enhancement of the rings of growth in consequence of the above coincidence.

This has an important bearing on the relative significance of the histological differentiations according to the time when the plants undergo foliar depletion and renewal. If, for instance, Pterocarpus echinatus, instead of putting out its new leaves during the cool damp month of July, it had to do this in the middle of the hot dry month of March, the ring of growth would probably be considerably enhanced. Similary the significance of the rings of growth would be reduced if those trees which now undergoes foliar repletion in March were to do so in July. Hence we are bound to conclude that the significance of the rings of growth of trees which put on their new leaf when the air at its maximum temperature and dryness is duo in part to the increased transpiration then occurring.

There are other interesting branches of this subject such as (*a*) the relation of leaf to flower production, and (*b*) the order of defoliation to direct light when trees are under open or close canopy or under partial shade, but as we are here confined to the relation of foliar periodicity to the xylem differentiation they need not be here discussed.

The most valuable facts will be obtained by studying the behaviour of selected trees from year to year and examining the tissues which have been produced during the periods of observation. The study was commenced while I was engaged as Scientific Assistant to the Director, R. B. G., Peradeniya, and I take this opportunity of expressing my gratitude to the numerous friends who have, and are still assisting me in this work.

ANNUAL REVIEW OF RUBBER MARKET FOR 1901.

KRAMRISCH & CO'S. (LIVERPOOL AND LONDON) ANNUAL REVIEW OF THE RUBBER MARKET FOR THE YEAR 1901.

During 1901 the Rubber Market has not been characterized by heavy or exceptional fluctuations; it was again not a particularly satisfactory one for holders and importers of the leading grades, and although trade remained exceedingly active throughout the year, the values of all grades of Rubber at the close are less than a year ago, and Fine Para shows a further recession of 3d. per lb. and other grades in proportion. The bulk of the stocks of Mediums has gradually been exhausted, although it must be admitted that the prices realised were exceptionally low and showed an enormous loss to the importers or holders, and even the more recent imports were disposed of at prices which not alone showed no profit, but in most instances the prices realised show a considerable loss. The imports of important Medium grades have fallen off considerably, and as the enquiry has increased for same we do not anticipate a further appreciable decline in values, and one ought certainly to advocate the encouragement of a substantial increase in the imports.

As regards the quality of Para Rubber, considerable grievance was again cause by the want of care in the proper selection of these grades, especially from the Island districts, and this has led to numerous disputes amongst contracting parties. Trade in Great Britain and with leading Continental Rubber works was was fairly good and the stocks of raw material at the factories are not large, and in spite of the fact that deliveries have been exceptionally heavy, the reported consumption of Fine Para exceeds that of previous years. The American market showed the position there not to be so strong except for the first few months, but generally speaking the Rubber trade has been busy and the only important speculative stocks are held by one leading American house, whose position at the close of the year was considered very precarious visible supply now of Para and Peruvian is 4,618 tons against 4,100 tons last year. This includes America with a stock of 2,005 tons against 1,200 tons last year.

Should the demand for Para Rubber continue good, the statistical position at the end of 1901 is certainly a very healthy one. The total for the year's crop (from July 1st to December 31st) amounts to 13,680 tons, this means an increase of 2,400 tons, while against this the total increase of the visible supply gives us only about 480 tons, thus about 1.920 more tons have gone into consumption, this despite the fact that it is well known that the "invisible" supply is exceptionally small. Although grave financial difficulties were experienced by many holders of Rubber, the position of the Rubber market is fairly sound, and with constantly increasing consumption, Rubber must be considered very reasonable at present quotations.

PARA KINDS.—At the beginning of the year we had to record a brisk enquiry for Para grades, and business on a large scale resulted. but, owing to continued "bear" operations, prices quickly exhibited an important recession, and while Hard Fine Para was quoted at the beginning of January at 3s. 10½d., Soft at 3s. 9d., Negroheads, Scrappy at 2s. 9½d., Island at 2s. 1¾d., Cametas at 2s. 4d., Peruvian Ball at 2s. 7½d., and Slab at 2s. 2d., prices declined rapidly during the latter portion of the first month, and sales for forward delivery at a marked decline were done on a large scale, with the result that prices for Para grades receded about 3d. per lb. by the end of the first three months. In America Fine Para was then sold as low as 3s. 6d., Scrappies 2s. 6¼d., Island 1s. 11d., Ball 2s 4d., and Slab 1s. 11d. per lb. We then began to receive the first advices from Para of probable short receipts, and some important buyers partly relying upon these reports bought large quantities, thereby causing considerable briskness; this improvement was actively maintained for a few weeks, and as high as 3s. 10d. to 3s. 11d. was paid for Fine during the middle of April. Other sorts were 2d. to 3d. per lb. dearer. Soon afterwards, however, the market again showed signs of weakness, the demand being somewhat dragging, and in July Hard Fine was quoted at 3s. 8d., Soft 3s. 6d., but a temporary reaction in August resulted in quotations again reaching 3s. 10d. to 3s. 9d. We have then had irregular declines of 2d. per lb., and in November Hard Fine was as low as 3s. 5¾d., Soft 3s. 3½d., the lowest of the year. Additional cable advices from Para of probable short receipts during the end of the year and the early months of 1902 brought about some recovery on less pressure to sell, and with very large deliveries and moderate receipts we

close the year firmly with quotations of Hard Fine at 3s. 6¾d. and Soft at 3s. 5¾d. Negroheads continue to remain very scarce, Scrappy being quoted at 2s. 9d., Island (of which the greater portion is being to America) 2s. 1½d., Cametas 2s. 2d., Ball, 2s. 6d., and Slab 2s. 0½d. The total amount of Rubber imported from Brazil shows a further increase of 3,200 tons, and the total quantity exported from the State of Amazonas, including Peruvian via Iquitos and Manaos, is 4,000 tons against 3,100 tons. The Peruvian Fine imported has we think been better as a whole, but owing to the Rubber having arrived in most cases uncut and unselected before shipment, new rules had to be adopted in order to provide for this altered mode of shipping this rubber. The Peruvian Ball imported has not been up to the expected quality, and at the end of the year the standard of fair average quality was considered lower, although some nice clean Hard Balls when received did realise fairly good, and in some cases exceptional prices. The slab continuous to be of good serviceable quality, and the consumption of it is certainly spreading. Bolivian kinds have been very fair, but the imports were not as large as last year. Mollendo again showed a marked improvement in quality, and consequently sold exceedingly well. From Venezuela via Orinoco the supply was less than last year and the quality not very attractive.

Imports of Ceara Scrap are smaller, but of these grades only the best qualities could be sold easily, others are dragging. Of Manicoba kinds we received less, but quality was good, and prices realised were satisfactory. Pernambuco and Assaree qualities have somewhat improved, but owing to the general decline of the Rubber market, the values of these classes receded considerably. There were not very important arrivals of good Mangabeira and although the stocks are considerably going down and available supplies very small, the prices realised for ordinary quality show an enormous falling off in price. The imports of Mattogrosso, in sympathy with Para, showed similar fluctuations, although transactions were only spasmodic. Central America has again been conspicuous by a further considerable decline in its export of Rubber, probably owing to the continued political unrest existing in those parts, and the only rubber reaching us comes from the Columbia districts, but the quantities were very insignificant. The Equator and Guayaquil kinds sold readily, and the prices at the end of the year are only about a 1d. lower than they were a year ago. Of course this refers to good qualities only. Inferiors and mixed kinds are much cheaper. The Imports from Honduras, Mexico and Panama were likewise very small.

Africans.—As expected at the close of the previous year, the increase in imports of these descriptions was not only not maintained but showed a considerable and serious falling off, and we estimate the difference of imports from Africa to be about 2,000 tons below that of last year.

With the exception of slight spurts in April and again in August (in sympathy with Fine Para,) the year 1901 has been characterised by an uninterrupted decline in African Rubber, the only exception being First Sierra Leone Niggers which are actually rather dearer than a year ago, while all other descriptions show a decline varying fim 1d. to as much as 6d. per lb.

From Angola we received 250 tons less, made up in shipments from Benguela of 1,250 ton, as against 1,500 tons in 1900. Loanda 730 tons, against 678 tons (besides 200 thimbles). Quality has been hardly so good. The congo has slightly increased, but the quality has seriously declined; about 5,300 tons, against 5,000 tons in 1900. The average price shows a very considerable fall because so much was of poor quality. The supply from Sierra Leone and French Guinea has again fallen off, partly owing to the prohibition by the French authorities of the exportation of dirty, wet, and inferior Rubber from Conakry. The quality being thus reliable has caused consumers to look on this kind with favor, and their appreciation is reflected in the price which is unusually high compared with other Rubbers, both African and Brazilian.

Quite an extraordinary decline in supply of Gold Coast, Accra, Lagos, &c., and only moderate from Cameroons, Sierra Leone, Gaboon, &c., and small of Senegal. Prices of nice Hard only about 2d. lower, but Soft common and Lagos fully 4d. decline for the year. We no longer quote Strips and Biscuit, the pressing of Lump Rubbers being practically abandoned. Liverpool imports of West African 4,200 tons, against 5,140 tons in 1900. and 5,600 tons in 1899.

The Congo Free State has given increased exports to Antwerp, but other kinds of African have gone there in reduced quantities, so that the total Antwerp imports show little change.

During January, African Rubber met with a disappointing demand at rather easier prices. February and March were very dull and prices declined for most sorts, closing with lower values all round. In April, fairly good trade was done at rather better prices, closing however somewhat quieter. A moderately large business was done in May at irregular prices. Good Sierra Leone sorts were then well in demand, showing however little, if any, change in price, whilst Lump descriptions were ½d. to 1d. per lb. lower. During June and July African Rubbers met with a moderate to poor demand at general lower rates, and only a comparatively small trade was done at barely steady prices. The demand was better in August, especially for parcels of good quality which arrived from Sierra Leone. This position of the market was not maintained, and we see a constant falling off in the demand, which remained disappointng with only small business passing at generally lower rates, until the end of November, when quite a steady trade was done at generally unaltered and in some instances slightly increased prices. The demand continued to improve during December for all the better grades, and rather higher rates were paid all round.

East Coast of Africa (Zanzibar, &c.)—The supplies of these descriptions have continued to gradually fall off, and to this must be ascribed the fact that at the close red hard Rubber is only 1d. per lb. lower, but White and common Ball Rubber declined about 4d. per lb. Lamu Ball (Mombassa): The arrivals were not important although the quality was fair and good clean Rubber sold fairly well prices, however, showing a decline of 2d. for the year. Nyassaland sent us very good Rubber, but the consignment were small, and when they reached, the market were bought up readily at fair to full prices. Madagascar supplies were again on the decrease, and have only been about half of what they were last year, and values were consequently well maintained.

Imports from Ceylon were again insignificant, but whatever small quantity reached this market it proved very attractive, as the quality and condition continued to be excellent, and many buyers were anxious to secure even the small arrivals, owing to the specially clean condition of this Rubber. We confidently expect that if larger imports could be arranged a great circle of consumers would come in and pay full prices for these grades, especially if the quality be kept up. It would be advisable to encourage the planters and others interested in this product in giving particular attention to this most valuable Rubber. High prices were realised, and 3s. 9¾d. was recently paid for Fine and 2s. 4d. for the Negroheads. It is, of course, known that this Rubber, should practically be of the same kind as the one coming from the State of Amazones, being grown from Para seed.

Rangoon and Penang has also been in much reduced supply. Of the latter description we practically received no further shipments this year, but in spite of

this, all the old stocks held were most difficult of sale, and what was disposed of showed an enormous decline and thus Rubber that was quoted at 3s 2d, a little more than a year ago sold at about 2s. 2d, to 2s. 5d. per lb. according to quality. If good quality of these descriptions could be imported to sell at present rates, it is certainly worth encouraging as with scarceness of Good red, Mozambique Ball, the demand for these Red Penang kind would again grow gradually.

Small quantities of ASSAM were shipped, but the quality was very poor and sandy, and consequently did not meet with any requirement or interest.

BORNEO.—Of this Rubber the supplies have not been excessive, but in sympathy with the general tendency of the market prices declined. These grades are still held for higher prices, and with a continuance of the lower quotations all round we must also look for much reduced values in these grades before one will be able to effect larger sales. PONTIANAK: Supplies were about the same as those of last year and sold readily prices showing very little change at the close of the year.

Rubber from FRENCH COCHIN-CHINA and from LOWER CHINA have continued to sell well, the quality and condition of nearly all arrivals were satisfactory and the small trade done must have been profitable to the importers.

JAVA Rubber and NEW GUINEA have been very very scarce, but generally speaking these qualities were not in great demand, and quotations were only nominal.

BALATA.—We had reduced arrivals of these descriptions, and all the imports of these grades have met with a good demand, although at one time Block BALATA was as low 1s. 7d. The year closes with buyers at 2s and sellers at 2s. 1d. Nearly the whole of the stock in first and second hand has been cleared off and gone into consumption, and all new arrivals are selling very readily at full prices. SHEET BALATA.—Owing to the increased consumption the prices have also gradually gone up, and the market closes with buyers at 2s. 7d., showing 4d. per lb. advance for the year.

GUTTA-PERCHA.—The year opened with a very poor demand, and the market continued weak throughout almost the whole of the year. It was only during November that, owing to larger contracts for cables being placed, extensive buying orders appeared on the market, thus increasing values of GUTTA-PERCHA, and since then a fairly large business has been done. There seems to be every prospect of a continued good market, with fair prices being paid for good and desirable qualities of Gutta-Percha.

AGRICULTURAL CHEMISTRY.

The second edition of the comprehensive work of Professor DEHERAIN on the subject of agricultural chemistry* has lately been published, and brings up-to date most of the more important investigations connected with the study of plants, and the cultivation of the soil. In his introduction, the author states that the plant is an "instrument of reduction," because within its cells are separated the element oxygen from carbonic acid (dioxide), which is a compound of carbon and the element oxygen; and from nitric acid, which is a chemical compound of nitrogen and oxygen The plant further takes these separated gases and unites them with the elements of water, whereby in a series of rapid stages they become converted into such substances as sugar, starch, cellulose, oil, and albuminoids. Plants are the only organic things that make use of the forces of the sun to build up from these elementary substances products alike suitable for human and animal food. The chief object of the author in his voluminous work is to show how the double work of reduction and of reconstruction, or building up, is carried on; also how we may obtain by the help of plants, a suitable climate, and a properly cultivated soil, such a quantity of vegetable products that its sale shall be remunerative.

One of the greatest of the practical problems presented for solution by agricultural chemistry is the conservation of plant food. With an abundance of plant food, and a favouring climate, it is difficult to place a limit to the power of the earth for supporting life. Should the cultivator succeed in raising the amount of food supply beyond that which his land would naturally yield, he is serving at once his own interests and those of the public generally, because both agricultural and horticultural prosperity are better secured by the increase of produce than by rise of prices.

The author commences his work with a description of the development of plants, including the germination of seeds, and the production and assimilation of plant food. The portion on growth and maturation has been considerably enlarged in the present volume. Next follows a full description of the importance of water; its circulation in the plant; the enormous evaporation excited by the sun's rays, which the plant can only maintain by constantly drawing upon the resources of the soil; should these fail, the plant languishes and dies.

The second part of the treatise treats of the study of arable land, which is described as a reservoir from which the roots of plants have to obtain their supply of water. It is only a properly cultivated soil that can fulfil its chief function of being a store-house of moisture. Water flows away over soil hardened by drought; it does not easily penetrate into a sun-baked surface; and because, under such conditions, it remains in the top layers of soil, it soon evaporates and is lost. On the other hand, water penetrates into a well-worked soil, is held in suspension, and remains there until wanted. It descends into the lower layers where the more deeply penetrating plant-roots feed. The plant-food of the soil only has access to the absorbent organs of the plant when presented in a proper soluble or semi-soluble form in connection with water.

The study of soil ferments has been largely extended in this edition; the author shows how the organic matter of soils becomes oxidised, how ammonia is formed, and how nitrates are reduced.

The third and fourth portions of the work deal with the subject of manuring. Considerable stress is laid upon the importance of a suitable supply within the soil of soluble available mineral plant-food, such as potash, lime, and phosphoric acid. The question of green manuring, that is ploughing-in growing plants, and the cultivation of autumn catch-crops, is recommended, because they retain the nitrates formed in the soil during the summer months. Green manuring further promotes the production of vegetable organic matter (humus) within the soil, and prevents the nitrates from being washed away by winter rains. Nitrogen in the form of nitrates is generally regarded as the best kind of nitrogenous food for plants. Plants obtain their nitric acid by absorbing the nitrates that are already present in the soil, those that are carried down to the soil from the air in rain and snow, those that are applied artificially in fertilisers, and those that are formed in the soil from the nitrogen of other substances. As is explained, all the nitrogen that is applied to the soil for fertilising purposes, especially in farmyard manure and in green-manuring, is not in the form of nitrates. It must first undergo certain chemical changes before it becomes available to plants. These changes take place through the agency of micro-organisms or ferments; and that particular process in which the nitrogen of the ammonia-gas is changed into nitric acid, which is called nitrification. One of the most active periods of the production of nitrates in the soil is during the early spring months, when the rootlets of growing plants greedily lay hold of it as it is formed.

It is not only by hindering the loss of nitrogen that catch crops are useful, but they also increase the

* *Traite de Chimie Agricole*, 2nd edition, 1902, P. P. Deheriau.

amount of humus in the soil. The function performed by humus was long misunderstood, but it is now known to be the soil's storehouse of nitrogen, and although not directly available to crops, it is rendered so by nitrificiation. Farmyard manure introduces into the soil these nitrifying organisms in large quantities, a quality not possessed by chemical fertilisers; a point of great importance, but which is sometimes overlooked.

The author goes on to show that the largest crops are to be obtained by a proper combination of farmyard manure and artificial fertilisers.

The end of the 19th century was marked by several great discoveries in agricultural chemistry. In 1876 Messrs. Schloesing and Muntz showed that the formation of nitrates in the soil is the work of special ferments. In 1885 M. Berthelot proved that the fixing of nitrogen in the soil takes place by means of micro-organisms; and in 1886 Messrs. Hellriegel and Wilfarth proved that Leguminous plants only make use of the free nitrogen of the atmosphere when they form on their roots nodules containing bacteria or microbes.

In order to promote nitrification, warmth, moisture and air must be present in suitable quantities and proportions. One of the objects of ploughing and digging should be to bring about the best conditions for nitrification, for if they are faulty this action may be feeble, or entirely arrested.

Nitrification is promoted either by long or short fallows (bare soil) conducted during the warmer months of the year, but if a super-abundance of rainfalls upon the land before growing crops have made use of the nitrogen rendered available by tillage, serious loss may accrue by drainage. This fact leads to the conclusion that fallow lands, and those which have received frequent tillage while producing a summer inter-tilled crop, should be fully occupied by plants before the autumn or winter rains occur.

Moderate rains may serve to carry the available nitrogen downward, but it tends to rise to or near the surface as soon as capillary action is restored. But if water drains through or passes over the surface of the land rich in soluble nitrogenous compounds, great loss of plant-food may take place. Nitrification is checked by the drying effect of growing crops: this can be obviated by the application of a dressing of nitrate of soda.

The author concludes his work by stating that much of the land of France is irrigated for market garden purposes. This practice is specially suited to lands broken up into small holdings. By presevering toil the gardeners of these districts are enabled to produce their early vegetables, cut flowers, and fruits, which are distributed all over Europe.

In these irrigated soils, enriched by copious manurings, micro-organisms and ferments multiply exceedingly, and push production to its maximum, because water is the first condition of fertility.

We can confidently recommend this valuable treatise to our readers, who will be fully repaid by a careful study of its contents.—*Gardeners' Chronicle*, Oct. 4.

FUTURE OF RHEA IN INDIA.

By J. Karpeles.

(Specially translated for *Planting Opinion* from the *Journal d' Agriculture Tropicale.*)

I wish to attact your attention to a new industry of British India, which I think is bound to play in a few years a very important part in the French textile markets especially against flax and hemp.

This is "rhea," whose cultivation has been so far in the experimental states in British India: the other countries in which rhea has been tried as a commercial enterprise are, however, not better off than British India. All the experiments made so far in Algeria and the Far East have, after the first period of cultivation, come to an abrupt end through the impossibility of properly decorticating the fibre, no machine having been known to give any industrial results. The employment of chemicals to remove the skin from the fibre after decortication, *i.e.*, after the wood is removed cannot be considered as solving the problem of the industrial production of a fibre ready to be put on the spindles. The acids which we are bound to use affect the fibre, taking away part of its strength and consequently of its value. The decortication of the stems when dry, which I will not discuss on the point of the value of the fibre, cannot be carried out in countries where the rainfall and consequently the production of the plant, is enormous, like India, Indo-China, and Java: where the air is so saturated with humidity during 6 months of the year that it is impossible to dry the stems. These would surely ferment and become valueless, and it is precisely during the six months in question that the production is the greatest.

The decortication of the dry stems being put aside as impracticable and the chemical process as dangerous there only remains the decortication of the green stems. I have succeeded in getting hold of a machine of French production, which gives perfect results, *i.e.*, a beautiful fibre, entirely decorticated and without the least trace of skin or wood. Established in British India, at Calcutta and Madras, for thirty years I had occupied myself so far nearly exclusively with indigo. The rivalry of the synthetic produce has had the results of lowering the prices of the natural indigo to such an extent, that it does not any longer pay many planters to continue their industry. The Government have been touched by the situation of the planters and have encouraged them, both privately and openly, to go in for new products. The cultivation of fire-bearing plants and of sugarcane were put forward at once. Since 1898 I have been pursuaded that indigo planters, who, only in Bengal, represent 1st-class lands to the extent of 150,000 hectares, were ready to go in in for rhea, provided it was possible to put before them some good and unquestionable results. Since 1899 I have had some small experiments made at three indigo plantations: at Dalsing Serai, (Durbungah), at Bungaon (Monghve), and at Pakabaree (Moorshedabad). The plant grew splendidly and after one year, one root becoming 15 or 20 roots, we could extend the cultivation sufficiently to order several machines and find out the production per acre and per machine, *i.e.*, the nett cost of the fibre. In the meantime the 3 plantations above mentioned were regularly giving 4 to 5 crops (cuttings) per annum and produce per acre, which had been at the start 35,000 stems per acre is today between 80 and 100,000 stems per acre. This is the number of stems which grow generally in China, and I remember reading in the "Journal of the Jamaica Agricultural Society" that the crop gave even up to 200,000 stems per acre.

In 1901, the experiments with the decortication could be commenced, the rhea being 2 years old and giving regularly stems 2 m. to 2·50 m. of length. I had imported from one maker 4 different types of machines, of which I sent one each to Bungaon and Patkabaree and two to Dalsing Serai. The former two plantations were unable to show any industrial result, but their produce was identical and absolutely pure, barring the gum, which was found in proportions varying between 25 @ 28 % as in the China grass of commerce.

The fibre obtained was found to to be about 3½ % of the nett weight of the stems, *i. e*, with their leaves stripped off. At Dalsing Serai, the machiney being perfect we could treat 4 crops, which gave us the following results:—

Number of stems per acre ..	80,000
Weight of stems per acre ..	5,500 kilos.
Produce of absolutely dry fibre	190 ,,
Produce of 2 machines per hour	9 ,, of dry fibre,

The above figures taken as a basis and calc lating the keeping in order and the amortization of the machines, the expenses of cultivation, the wages and the incidental expenses at the same rate as with indigo, we can produce rhea at abocut 350 francs per ton in India or about 450 frans c. i. f. French ports. This price is evidently only approximate, the eventuality of losing one or more crops not being impossible, but is low enough to have caused a great stir in Governmental circles and among the planters. The Lieutenant Governor of Bengal, Sir John Woodburn, asked me *proprio motu* to visit him and give him explanations about rhea, also the Minister of Finnance and commerce, Sir Edward Law, who has been encouraging me for the last two years. Both these gentlemen took the trouble to go to Dalsing Serai, 12 hours journey from Calcutta, to see for themselves the results obtained, and to them may be added H. H. the Maharajah of Durbungah, a member of the Viceroy's Council and the biggest landholder of Bengal. This chieftain has ordered to be made, through the administration of his possessions, an agreement with me for the immediate putting under rhea of 500 acres. Many planters are going in for rhea and in 3 years there will be about 5,000 hectares under rhea, which will have abs rbed several hundred machines. This will be a great success for the French mechnical industry. The use of rhea by the French spinners can be considered so far theoretical. The few Spinning Mills employing China grass at Entraigues, Malannay Billegarde, Amilly, and Lille are not important enough to constitute an industry, but it is evident that the day it will be possible to put on the maket important quantities of rhea fibre at moderate figures, these mills will become larger and the 1500 tons maximun they consume now will speedily become 1500 tons. I have sent to Lille some samples of the produce of our plantations and I was told that the fibre as it is, without any degumming, can be used by hemp and flax spinners for their big and middling counts. There is an assured and big outlet for the middling and big counts; therefore direct competition with hemp. The spinners of China grass (rhea) use the fibre undegummed and don't want the produce to be delivered degummed, preferring to regulate the degumming themselves. The flax spinners will only be able to use rhea from India for their fine counts after degumming. As the spinners are not at present organised for such a process and to justify expenses for instalations of this kind the net cost of the undegummed fibre should be very low or we should deliver a degummed article. The latter presents, however, such difficulties, as regards the risk of turning out an article insufficiently or too degummed, that the danger of competition with flax, to produce fine counts, rivalry that is bound to come some day, cannot be said to be so imminent as with hemp.

CULTIVATION OF PINEAPPLES.

By W. Cradwick, Travelling Instructor.

Soil.—The best soil for pineapples is a rich well-drained loam, they cannot be grown profitably on any other. The colour of the soil does not matter, but there must be at least fifteen inches of good sweet top soil on the land in which the pines are to be grown.

Drainage.—The top soil must be thoroughly plowed and broken up. If below this, the soil is the least bit heavy, trenches to the depth of two feet must be dug to thoroughly drain it. If the lower layers of soil are clay, trenches three feet deep must be dug. If the level is so low that water lies at or near the surface, raised beds three feet high should be made on which to plant the suckers. This plan has been very successful near Hope Bay. Pineapples must have the best drainage possible or or they will get all sorts of "disease."

Preparation of Soil.—Next to drainage in importance is the thorough forking and breaking up of the soil. There is an old Creole proverb that a pineapple sucker "planted with one chop bears in one year, with two chops in two years, and so on." The origin of it in my opinion is that when planting in new rich soft land, when a hole big enough to receive the sucker was easily made with one chop of hoe or digger, the pine sucker invariably produced a fruit within the year. When planting in old hard land where it was necessary to make two or three chops in order to make a hole big enough to receive the sucker, the sucker for want of cultivation or soil naturally soft, took two years to fruit. This explains how necessary it is to cultivate the land thoroughly.

Selection of Suckers.—Plant nothing but good strong, fresh, stout *young* suckers; the proper size is from twelve to fifteen inches. Anything bigger or smaller is a mistake. Thin weedy shade-grown suckers are dear at a gift. Overgrown plants are not suckers, and should only be used to grow suckers from. In purchasing suckers, see that they are pointed just as they are torn away from the parent plant; for old long suckers can readily be trimmed down to look as short as young suckers.

Planting Suckers.—As soon as the sucker is taken off the old plant, it should be planted. If it is a fresh healthy one, it wants nothing at all done to it. If it is not a good healthy one, burn it. If you plant a poor sucker it will be a trouble all the days of its life. Never let suckers lie about in heaps; never let them get wet.

Have your land properly prepared and when the suckers are taken off, plant them as quickly as possible. The land should be so soft that the suckers can be pushed down to the proper depth without having to use anything to make a hole with. Plant the suckers in beds not wider than can be weeded from the sides without having to step on them. Pineapples must have soft soil, and if the beds are walked on every time they are weeded, they soon get hard and stop the roots growing.

Cultivation.—Never allow the weeds to grow Stir the soil often, using a dutch or push hoe, this is much better than the draw hoe which is very liable to bruise and shake the suckers when trying to dig out weeds which grow close to them.

Distance.—Different varieties can be planted at different distances: the Ripleys and Bullheads eighteen inches; Smooth Cayennes two feet to two feet six inches.

Replanting.—Replant every year, never trust to ratoons. It is only by replanting every year that the quality of the fruit can be kept up, and the fruit made to come in at the right time. Ratoons will nearly all come in at the time of year when pines are not wanted. Pineapples are worth very little after the May rains begin, and everbody should make experiments in planting so as to find out the right time to plant to make their fruit come in at the right time, that is from Christmas up to May. The time will be different in different places.—Jamaica Bull. *Plante's Monthly.*

The Sandalwood Tree.—Mr. Barber, Government Botanist, Madras, has made the interesting discovery that the roots of this tree are parasitic in character, and puts forward a plea for a closer study of the natural history of the tree. "It appears to me," he writes, "sufficient attention has not been given in past attempts at artificial reproduction, and a careful study of the liking of the Sandalwood for its different hosts is sure to be productive of useful results."—*Gardeners' Chronicle.*

THE INDIARUBBER TREE:
ITS LATEX-BEARING DUCTS.

BY HENRI LECOMTE.*

The *latex* of the caoutchouc plants is contained in lacticiferous channels, whose distribution varies with the nature of the plant and perhaps also with its biological conditions. It is evident that an exact knowledge of the distribution of the *laticifers* (the *latex* bearing ducts) is indispensable for fixing the regulations of methodical work. Unfortunately, this study has been neglected, so that tho processes of extracting the *latex* are altogether empirical. My present intention is not to consider all the cases that may arise but simply to call attention to certain facts and considerations, which may enlighten experimenters in their researches.

For example in the Landolphia Heudelotii, which furnishes the larger part of the caoutchouc exported from the Senegal, the Soudan, and Guinea) in west Africa,) it is easy to recognize from a cross section of the *liane* (climbing plant), that the laticifers are especially distributed in the middle portion of the bark but are almost altogether lacking in the outer portion, as well as in the zone nearest the wood.

To reach the laticifers, there is therefore need of penetiating through the bark. The laticifers of the *Landolphia Heudelotii* are long tubes, ramified and anastomozed, whose diameter varies from 30 to 45 thousandths of a millimeter. These laticifers extend principally along the stem, but, as I have said, they are ramified, and these ramifications take a direction more or less oblique.

A transverse section *a b* of determined length and depth, may, for example, encounter a number of laticifers and produce a proportionate number of orifices from which the latex will flow. A longitudinal incision *c. d.* of the same length and depth, will meet a much smaller number.

The inspection of the figure (1) will render further explantation superfluous; but it is not difficult to

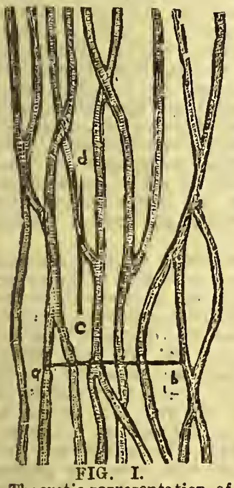

FIG. I.

Theoretic representation of the arrangement of the laticifers.

a b—Cross section meeting six laticifers.

c d—Longitudinal section meeting only one laticifer,

demonstrate the fact at least in the case of the *Landolphia Heudelotii*. It is known—and this is the point of departure of the processes of the extraction of tho caoutchouc from dry bark—that the *latex* coagulates spontaneously in the laticifers of the bark when it dries, so that each laticifer of dry bark contains a very thin filament of rubber. If a piece of dry bark is broken and the two fragments separated carefully, they are seen to be united by a multitude of rubber filaments, the number being equal to that of the laticifers encountered by the section (Fig. 2.)

Let this section be made perpendicularly to the length of the stem, or parallel to this length: the filaments are still found in large number if the section is crosswise, but in small number only if it is longitudinal. Fig. 3 drawn from nature, exhibits this clearly. A piece of bark of rectangular form was separated in to parts by a perpendicular section along the length of the stem; the two portions were still connected with numerous filaments of rubber. If one of these fragments was afterwards broken in two parts, by a section parallel with the axis of the stem, and the two parts *a* and *b* separated, as shown in Fig. 3, they were seen to be connected by a small number only of thin threads of rubber, cause such a section meets a much less number of laticifers than a cross section of the same extent.

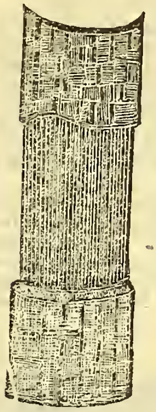

FIG. 2.

Two pieces of bark broken apart crosswise, but still connected by a large number of caoutchouc filaments.

We may, therefore, consider it demonstrated that two equal incisions made in the bark will encounter very different numbers of the laticiferous ducts, according as the section is longitudinal few laticifers or transverse many laticifers; it is not difficult to conclude that the cross section will cause a much greater quantity of the *latex* to flow than the longitudinal section. This is very easily shown on living climbing plants belonging to the genus *Landolphia*.

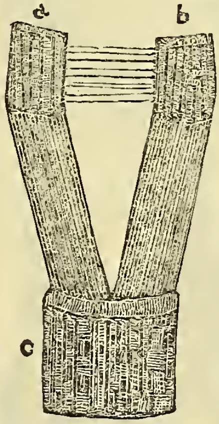

FIG. 3.

Illustration exhibiting the caoutchouc filments connecting two strips of bark.

Between *a* and *b*, the filaments proceeding from the transversal inosculations.

Between *a b* on one side and *c* on the other, the filaments correspond to the laticifers encountered by a cross section.

I have also verified the fact on a young *Castilloa elastica*, which was placed at my disposal by Messrs. de Vilmorin. Dr. Morris, in his Cantor lectures, published in the *Journal of the Society of Arts* London has stated that in the trees of the genus *Hevea*, cultivated in the Henaratgoda garden in Ceylon other things being equal the oblique incisions. (45°) produced about twice as much as the vertical incisions.

The transverse incisions have another advantage with reference to the gathering of the *latex*. In consequence of the constant growth of th el gneous cylinder surrounded by the bark the latter, not following this growth, is stretched more and more, like a too narrow garment, around too voluminous a body. It is this tension of the bark which causes the longitudinal cracks, so characteristic, for example of the surface of the bark of an oak tree. If an annular cross band of bark is removed from the trunk of a tree, and the attempt afterwards made to replace it at the spot from which it was taken, the two extremities will not meet.

It is precisely this tension which causes the flow of the latex, which the capillarity would keep, in the absence of this intervention, in the interior of the laticiferous ducts. In making a cross section, the tension of the tissues above and below this section is not modified. The result is that the latex will flow as freely as possible. A longitudinal section, somewhat extended, would, on the contiary, produce different

*Translated from the *Journal d' Agriculture Tropicale* (Paris, April 30, 1902), for THE INDIA RUBBER WORLD. The suggestions contained in this article were presented in a popular lecture on "Caoutchouc and the Plants which Furnish It" delivered by this botanist at Paris, on March 4, under the auspices of the French Association for the Advancement of the Sciences.

results, for the two lips of the wound would tend to separate, and the tension would become feebler.*

As is seen, several causes contribute to render more efficacious the transverse incisions of the bark, with reference to the flow of the *latex*. But are these sections to be exclusively recommended? That is not my opinion: for the cultivator ought not merely to have the present harvest in view, but the possibility of future harvests. From this viewpoint, the transverse incisions may be disastrous, and the more so as they are the more extended.

Every wound made in a bark produces a scar more or less rapidly by the formation of new tissues, and from this fact the laticifers, at first continuous, are separated into portions, the shorter as the incisions are the nearer. It necessarily results that the future incisions meet only fragments of laticifers yielding only a small quantity of *latex*.

In my opinion, and for the reasons mentioned above it would be suitable, if transverse or oblique incisions are to to be made in a shrub or tree, to first make a number of incisions at the same height—say 3 meters from the ground—then to commence afterward a little lower, and so on until the last incisions occur near the ground. Then on leaving the tree at repose for a sufficiently long period—at least a year—new tissues will be formed in the interior of the bark and in these new tissues prolongations of the original laticifers will penetrate. After this period employed by the tree in producing new tissues, containing laticiferous ducts, incisions can be made again, identical and in the same order.

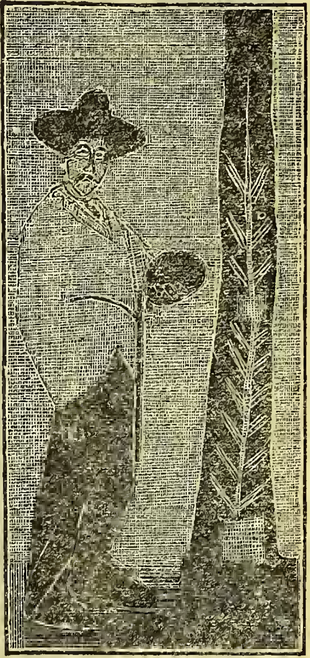

FIG. 4.
This view not presented with M Lecomte's paper illustrates a prevalent method of cutting the rubber tree (castilloa elastica) in Mexico.

In no case should completely annular incisions be made. This will prevent the circulation of the sap and compromise the life of the plant. Too wide incisions distance between the edges of the incisions should also be avoided; for the healing of the wound is the longer and more difficult in proportion as the edges are further separated from each other.

It will not be difficult to fix upon the plan of a certain number of methodical experiments and observations which persons living in the tropical regions, and having at disposal rubber trees or plants, might undertake. The results of such an inquiry would be important with reference to the future of the plantations of caoutchouc which of late are coming into existence so generally in all the tropical regions of the globe —*India Rubber World.*

*It is not correct to say as Bouyssou, has in the *Revue Generale des Sciences* that the *latex* is a kind of ascending sap. I do not think that any proof whatever has been yet presented of the circulation of the *latex* in the ducts. The fact that the *latex* flows unequally at the lips of an incision is a direct consequence of the difference of tension of the tissues on the different sides of the incision and the flowing may naturally be greater at the upper lip of the section than at the lower. This I have verified with the *Landolphia florida* in the hothouses of the Museum. The fact that the incisions made near the ground (*Hevea* produce more *latex* than the same at a height of 2 or 3 meters scarcely be explained except by a difference of tension of the tissues at different heights

PLAIN TALK TO SMALL OWNERS IN WEST INDIAN ISLANDS.*

(*By His Honour F. H. Watkins, Commissioner of Montserrat.*)

(*Concluded from page 226.*)

TROPICAL PLANTS AND INDUSTRIES.

There are many small industries suitable for the tropics, but I will touch briefly on three—cacao, ginger, and bee-keeping.

CACAO.—It is true that in Montserrat there are no large areas suitable for cacao, but in every district suitable, small patches are found on which even a few trees could be grown with profit. Mr. Whitfield Smith, in an interesting report on cacao growing in Grenada, has shown what can be done on a small estate under seemingly disadvantageous conditions. From this small estate an average return of 7 bags of cacao to the acre was obtained. With cacao selling at only £3 per cwt., this would mean a return of over £30 per acre. For cacao select a sheltered spot, and plant even if it be but a dozen or more trees. Bananas and ground provisions can be grown between the trees until they come to perfection. Look after your trees well as if they were pet children, and you are, in a few years, almost certain to make a profit. Choose your pods and seeds carefully. There are many varieties: the short smooth-skinned pods or Calabacillo cacao; the Forastero or Trinidad cacao with big heavy, straight pods; and the Criollo with long, curved pods, constricted at the upper end, tapering at the lower, with a deeply wrinkled skin. The last named should be chosed, for the Spanish or Calabacillo variety does not contain as many seeds in the pod, and they are smaller and flatter and slightly bitter. The consequence is that the crop is smaller and inferior.

GINGER.—The Consular reports of Central America have of late years been calling attention to the opportunities afforded, for making fair profits out of the cultivation of ginger. An excellent article on the subject appeared in a recent number of *Chambers' Journal*. According to this article the soil for this crop should be of a rich vegetable composition, loose and moist, yet well drained. Sandy or heavy soils should be avoided. It is advisable to select what are known as the more temperate, that is, hill regions of the tropics where the rainfall is more or less abundant. The soil should be loosened by the hoe when the ground has been furrowed. The soil is banked up in ridges small holes are made 3 inches deep and one foot apart. Then healthy roots, or rhizomes, are selected and carefully divided into short lengths, each fragment having at least one shoot attached. One of these pieces is placed in each hole and covered up with fine earth containing as much vegetable matter or manure as possible. Planting generally takes place about April or May, and the land is regularly weeded.

Four months after planting the plants will commence to bloom. Towards the end of the year both the flower-bearing and the leaf-bearing stems begin to

* *Imperial Department of Agriculture for the We Indies.*

fade and then wither. The rhizomes, or roots, should then be harvested like potatoes, but care should be taken not to injure the 'races' or 'hands.' When the 'races' have been freed from the small fibrous roots, they are sent to the market either as green or cured ginger. The cured article may be either 'coated' or 'uncoated' ginger. The former, also known as 'black' ginger, consists of pieces of rhizomes, or roots, about four inches long which have been plunged into boiling water to kill them, and afterwards thoroughly dried. The drying is usually effected by spreading out and exposing the roots to the sun. During the process the ginger must be occasionally turned, while it is advisable to take it in every evening just as the sun goes down on account of its tendency to mildew. The 'uncoated' or 'white' ginger roots are well washed and *scraped* or *peeled*, and then put up to dry from 5 to 10 days in the sun, being sometimes bleached in a weak solution of chloride of lime. Provided they are kept from the sun, the roots may, if necessary, be kept for two or three days after digging before being scraped or peeled; but it is preferable to scrape or peel without delay. In some places the ginger, after drying is put into baskets and undergoes a 'bumping' operation for 2 or 3 hours daily for several days, which is believed to facilitate its 'keeping' properties but this process is not usual. The entire operation of curing could be done by women and children. Ginger, depending on the quality, fetches from £2 to £4 per cwt . .

Experiments at the Grove have recently shown that a patch of ginger yielded at the rate of 14,000 lb. of green ginger which shrunk, when dry, to 5,000 lb. per acre. The value of this when *well cured* would probably be about £40.

Bee-Keeping.—Many of you may have heard the interesting lectures given by the Bee-Expert, recently employed by the Imperial Department of Agriculture who visited the island early last year. By that visit bee-keeping received a stimulus, and several persons have engaged in what may be made a most fascinating and profitable study and occupation. A few remarks based on the experience of those at present engaged may be of value and interest. First, as to the cost of starting in bee-keeping. It is as well to commence with only two hives so that your attention may be concentrated upon them. The initial cost for the two hives would probably be:

		s.	d
(1)	Two hives, with one super (locally made)	14	0
(2)	Six additional supers —	6	0
(3)	Two Italian Queens —	12	6
(4)	Two swarms — —	9	0
(5)	250 Sections — —	5	0
		£2 6	6

From these two hives the following annual results could reasonably be expected:

Honey in sections........256

or Extracted honey...——160 bottles.

The present price (and I must give the warning that, as most of the neighbouring islands are gradually engaging in the industry, the prices will fall there) is from 6d. to 9d. a section, and from 6d. to 1s. for a bottle of extracted honey. This is a very fair return within twelve months with an original outlay of £2. 6. 6. After the first year there are fewer expenses, with consequently greater profits.

Montserrat honey has received high praise in the other islands. For fuller information about this subject, see the valuable, well illustrated pamphlet issued by the Imperial Department of Agriculture, called *Bee-keeping in the West Indies*. It can be obtained from the Local Agents of the Department price 4d.

Regulation of the Quality of Exported Fruit. At the West Indian Agricultural Conference held last January, the Hon. S. Olivier, Colonial Secretary of Jamaica, read a paper on 'Regulating the quality of Exported Fruit.' According to the official report of the proceedings, he pointed out how owing to the regrettable action of persons shipping immature or badly packed fruit there was a very real danger threatening the fruit trade of these Colonies. If such a course were pursued without check West Indian fruit would earn a bad name, and fail to command the confidence of the market. He stated that it was impossible to forbid absolutely the importation of any kind of fruit, however bad, or to give a Government guarantee after inspection to all fruit shipped.

He proposed a general scheme, the main features of which were:—

(1.) The establishment of a complete register of all growers and packers, with a nominal licence for packing house.

(2.) The marking of all packages with the name and address of the packer and his packing houses.

(3.) The establishment of standard grades for size and quality of fruit throughout the West Indies.

(4.) The inspection of the packing houses and packages, at any point before shipment, by proper inspectors.

(5.) The presence of a responsible agent in the selling market.

(6.) It was suggested that, to maintain a high standard of fruit exports, inspectors should have power to brand packages found to be improperly described.

You will thus understand the importance of placing a good, and at the same time a well graded quality of fruit or vegetables on the market. Two or three points are to be observed. Taking onion growing, for example, you have to ensure;—

(1.) That a good quality is grown.

(2.) That only the good onions are exported, and in boxes containing equal sizes.

(3.) That onions of different varieties are kept separate.

(4.) That each year the same kind of onions are sent under the same name.

(5.) That you send to your market the onion that people want, not what you think they want, or should want. This persistent disregard of what the buyers require and attempts to force upon them articles which we suppose they ought to use, have done more than anything else to injure British commerce. People will often pay fancy prices for what they like, but absolutely refuse to look at what they do not want.

(6.) That you always keep a good name in business transactions. A good name is a considerable asset in business, and you must resolutely set your face against any one attempting to injure the good name of any West Indian industry.

Experiment Stations.—Before concluding I beg to advise you to pay frequent visits to the Experiment Stations and Plots which have been established in this island by the Imperial Department of Agriculture. Here you will not fail to learn valuable lessons and gain information of the highest interest. I often walk through them myself and never leave without having gained both pleasure and profit.

Concluding Remarks.—Such is a brief sketch of of what has occurred to me with regard to what small owners might do to help themselves. Even if the sugar market were most favourable and the stern hand of compulsion were not pushing us onwards to seek other means of livelihood, profit and pleasure might be derived from the pursuit of these minor industries. In the times before us, that must in any case be fraught with anxiety, we need to induce every one to act vigorously, and to lead them to work industriously and intelligently. No work is worth doing badly; and he who puts his best effort into every task that comes to him will surely outstrip him who lazily awaits his opportunities.

ON SOME NEW SPECIES OF EUCALYPTUS.

By R. T. Baker, F L. S., Curator, Technological Museum, Sydney.

[From the Proceedings of the Linnean Society of New South Wales, Part 4.]

(Concluded from page 229.)

(Concluded from page 229.)

Eucalyptus Woollsiana, sp. nov.

"Mallee Box."

(Plate xliii.)

A large tree up to 80 feet high, and more than 3 feet in diameter. Bark Persistent half-way or more than half-way up the trunk; smooth, chiefly of a rich brown, colour.

Sucker-leaves lanceolate, alternate, 2-3 inches long, ½ to ¾ inch broad. Mature leaves under 6 inches long, on a petiole less than ½ inch; narrow-lanceolate, tapering to a fine recurved point, mostly of a thin texture, of a light yellowish-green, sometimes slightly shining; venation obscured, impressed on the upper surface; lateral veins few, intramarginal vein removed from the edge.

Peduncles axillary, from 2-12 lines long. Flowers few. Calyx about 1 line in diameter, tapering into a short stalk. Operculum hemispherical, acuminate, and often shorter and *more obtuse than shown in the plate.* Ovary flat-topped. Stamens all fertile; anthers parallel; connective large and long, attached at base to the filaments.

Fruits small, 1 line in diameter, hemispherical to slightly pear-shaped; rim thin, slightly contracted, valves not exserted.

Hab.—Girilambone, Cobar and Trangie (W. Bauerlen); Nyngan and Murga (R. H. Cambage).

This tree is a half-barked "Box," and allied in bark and timber to *E. populifolia*, *E. albens* and other cognate box-trees.

Of all the box trees described this species has probably the narrowest leaves. The fruits are small, and some what approach in shape those of the Green Mallee, *E. viridis*, Baker; but the bark, timber, and chemical constituents of the kino and oil differentiate t from that species.

The leaves have a shining surface occasionally, as pertains to *E. populifolia*, F.v.M., or *E. Behriana*, F.v.M. It differs from *E. microtheca* in the valves of the fruit not being exserted, in the colour of the wood, and in the bark and chemical constituents.

From *E. hemiphloia* it differs in the nature of its timber, oil, buds, and leaves; from *E. pendula*, A. Cunn., in the venation and shape of the leaves, the shape of the fruits and constituents of the oil, and particularly in its timber, and it has a more erect habit than this species. *E. populifolia* has much wider leaves, but the bark of the species is very similar, but is not associated in any other respect with this species.

Mr. W. Bauerlen states "that it is usually associated with *E. populifolia*, the Green Mallee (*E. viridis*, Baker), and the Grey Mallee (*E. Morrisii*, Baker), on which account it is called "Mallee Box.' I have never seen it in mallee form, and as a result of my inquiries it appears that it does not grow in that form"

Of described species it is most closely allied to *E. hemiphloia* and other "Boxes" in oil, kino, and botanical characters.

It differs from *E. conica*, Deane & Maiden, in height, bark, timber, oil and fruits.

Athough the two species are not easily separated on herbarium material, they are never confounded in the field.

Timber.—Hard, close-grained, interlocked, heavy, durable timber, of a brownish colour. Useful for bridge-decking, posts, railway sleepers, and general building purposes. It is in great request at the Cobar mines for shoring the roofs.

Kino.—Turbid in cold aqueous solution, but the turbidity is removed on boiling. The constituent present besides tannin is "endesmin" (H. G. Smith). The kino is plentiful even on trees not it any way injured (W. Bauerlen).

Oil.—The yield of oil from a large number of distillations was ·495 per cent. The oil contains but a small quantity of eucalyptol, less than 5 per cent., and consequently is not a commercial oil. It contains the aromatic aldehyde previously known as cuminaldehyde, and which constituent appears to be characteristic of true "Boxes." It has now been described and named (aromadendral.)

The specific gravity of the crude oil at 15° C. is ·889. The specific rotation of the crude oil is [a] D—13 7°.

The lævo-rotation of this oil is due to the presence of the aromatic aldehyde (aromadendra).

Phellandrene is not present in this oil (H. G. Smith)

E. Umbra, sp. nov.

"Stringybark" "Bastard White Mahogany."

(Plate xliv.)

A tall tree, attaining sometimes a height of 100 feet, with a dark-coloured stringybark.

Sucker-leaves opposite, sessile, cordate, ovate, acuminate, thin, pale-coloured on underside; venation more pronounced on the underside; upper surface shining; over 3 inches broad and under 6 inches long. Mature leaves lanceolate, falcate, large, up to 9 inches long and 1½ inches broad, *pale-cured on both sides, coriaceous*; venation very distinct; lateral veins distant, spreading, oblique; marginal vein removed from the edge.

Flowers in short axillary peduncles, 6-9 in the umbel. Calyx 1 line long, on a pedicel about 2 lines long. Operculum hemispherical, shortly acuminate. Ovary flat-topped. Anthers kidney-shaped.

Fruits in the early stage pilular and under 3 lines in diameter, and the rim thin and valves sunken, but in the mature stage inclined to be pear-shaped with a diameter of 5 lines, and a very thick red rim.

Hab.—Wardell, Dundoon, and Tumbulgum (W. Bauerlen); Peat's Ferry, Military Road (R. T. Baker); Tinonee (J. H. Maiden); Gosford (J. Martin); Cowan Creek and Milton (R. H. Cambage); Eastwood (R. T. Baker).

The early fruits of this species have a remarkable resemblance to those of *E. acmenoides*, Schau; in fact, so much so, that in herbarium material the two have very probably on this character been confounded in the past. The two species differ however, considerably in the shape, texture, colour and venation of the leaves, as well as in the mature fruits, which have a broad rim.

E acmenoides, Schau; has thin leaves with a pale undersurface, the leaves undoubtedly resembling those of an *Acmena* (*Eugenia*, as now understood). But those of *E. umbra* are of a uniform colour on both sides, longer and broader, and with a very marked venation much like that of *E patentinervis*, Baker.

The sucker leaves are quite distinct from those of *E. acmenoides*, which also has a lighter-coloured bark, but a superior timber.

E. acmenoides is well figured by Mueller in his "Eucalyptographia," and this species can be from the above description easily distinguished from it, so that it is not considered necessary to give a drawing here.

In botanical sequence it should be placed it next to *E. acmenoides*, from which species, however it also differs in the chemical constituents of its oil, as well as in the nature of its timber and bark.

The broad sucker-leaves differentiate it from any described species of Stringybark, to which division of the Eucalypts it undoubtedly belongs; and, as stated above, this is one of the characters which separate it from *E. acmenoides*, Schau.

Mr. W. Bauerlen gives the following description of this tree as observed by him in the northern scrubs:—

"Height 40-80 feet; diam. 2-4 feet. Bark stringy, used for bark. Timber usually pale coloured, much like that of *E. acmenoides*, which tree it resembles also in the bark and general apperance, but is easily distinguished from it by its broader and thicker leaves, with a more bluish colour; especially by the very broad young leaves, somewhat yellowish in colour and c nspicuously veined, while those of *E. acmenoides*, are much smaller, narrower, thinner, and of a deeper green colour; in fact, much resembling those of *E. microcorys*, with which species both are associated, yet only *E. acmenoides*, penetrates with *E. microcorys*, into the rich scrub, while this species is only found in the poorer forest country. The two species being otherwise much alike in general appearance, they are readily distinguished by the timber-getters, who invariably prefer and select *E. acmenoides* for splitting into posts and rails, etc., for which purpose *E. acmenoides* bears an excellent name, whilst this species is somewhat inferior, and does not split quite so well."

TIMBER.—A dirty pale coloured timber, darker than White Mahogany, *E. acmenoides*, Schau. It is subject to the attacks of a borer, which, of course, deteriorates its quality as a marketable timber. It is hard and close-grained, but does not season well, and is altogether a much inferior timber to White Mahogany, *E. acmenoides*—a fact well known to the timber-getters.

OIL.—The yield of oil from this species is ·155 per cent. No phellandrene was found, but much dextropinene was present. It contains but a minute quantity of eucalyptol.

The characteristic constituent of the oil from this species is an acetic acid ester. The specific gravity of the crude oil at 15° C. was ·8963.

The specific rotation of the crude oil was [a] D +41·5.

The saponification figure for the ester was 35·8.

Another consignment of the leaves of this species were received a month later, and gave practically identical results, showing again the constancy of the constituents in the oils of the same species.

The yield of oil was ·169 per cent.; specific gravity crude oil=·8901.

Specific rotation crude oil was [a] D+43·8, and the saponication figure for the ester was 35·3 (H. G. Smith, F.C.S.).

E. NIGRA, sp. nov.

"BLACK STRINGYBARK."

(Plate xlvi., fig. 3.)

A tall tree with a black stringybark.

Leaves lanceolate, scarcely falcate, occasionally oblique, mostly under 4 inches long and under 1 inch wide, of a dull green colour; venation only faintly marked on the upper surface, but very distinct on the lower; lateral veins oblique, distant; intramarginal vein removed from the edge.

Peduncles axillary, short, under 4 lines, bearing a cluster of from 8-12 small flowers. Calyx hemispherical under 2 lines in diameter, on a short pedicel. Operculum hemispherical, acuminate about 1½ lines long when mature. Ovary flat-topped. Anthers very small parallel, filaments very slender.

Fruits about 4 lines in diameter, hemispherical, to pilular, rim variable, thin, or truncate and even domed occasionally, valves slightly exserted.

Hab.—Richmond River District (W. Bauerlen); Cook's River Sydney (H. G. Smith).

From *E. Wilkinsoniana*, Baker, and *E. macrorhyncha*, F.v.M., it differs in fruits, timber and chemical constituents of the oil. From the stringybark, *E. umbra*, Baker, of this paper it differs in the shape of the sucker leaves and chemical constituents of the oil, although the imature fruits of these species are somewhat similar.

E. eugenioides, Sieb., and *E. capitellata*, Sm., approach each other very closely in morphological characters, and there often seems to be a gradation between the two, but, nevertheless, the two species are quite distinct; and so in this, although there also appears some similarity in the fruits of this species and *E. eugenioides*, yet the two differ in too many characters to be the same species.

The sucker-leaves are not unlike those of *E. capitellata*, whilst the buds are similar to those of *E. eugenioides*. The fruits approach somewhat in shape those of the latter species, with which it has probably been confounded in the past when determined on dried specimens.

If it were not for the distinctive character of the timber and oil I should certainly have made it a variety of *E. eugenioides*, but the former product is of too poor a character to be associated with so excellent a timber as that yielded by White Stringybark, *E. eugenioides*. The oil also differentiates it entirely from that species.

On the sum of the above differences it was decided to give the tree specific rank, and botanically it is placed next to *E. dextropinea*. Baker, from which it differs in the shape of the fruits, barks, leaves and chemical constituents. From *E. lævapinea*, Baker, it differs in the shape of the fruits, quality of timber and constituents of the oil.

TIMBER.—of a *dark brown colour* (hence the specific name), much effected with borers and not valued for durability by timber-getters and others interested in the trade.

OIL.—Yield very small, only 3½ oz. from 534 lb. of leaves in fact too small to make a fractional distillation, It has thus the smallest yield of the stringybark, next to *E. capitellata* (H. G. Smith).

EUCALYPTUS LACTEA, sp. nov.

"SPOTTED GUM."

(Plate xlvi., fig. 5.)

A fair-sized tree with a dirty, flaky bark, which occasionally is smooth.

Sucker leaves ovate; leaves of mature trees lanceolate, up to 6 inches long and varying in breadth up to 9 lines, straight or falcate, not shining, of the same shade of green on both sides; petiole under 1 inch. Venation fairly well marked, veins oblique, spreading, the distinct intramarginal vein removed from the edge. Oil dots numerous.

Peduncles axillary, with few flowers (5 to 7) in the head, occasionally only 3 Calyx hemispherical. Operculum hemispherical, shortly acuminate. Ovary flat-topped Stamens all fertile; anthers parallel, opening by longitudinal slits.

Fruits hemispherical to oblong; rim with valves domed and almost touching, thus leaving only a slight aperture to the ovary; or the rim thin and the valves exserted and widely distended.

Hab.—Mount Vincent, Ilford (R. T. Baker); Oberon Road, O'Connel (R. T. Baker, R. H. Cambage); Southern Road, Wingello (R T. Baker, H. G. Smith); along the main Western Road, Blackheath, and Mt. Victoria (R. T. Baker).

In the field this tree might be confounded with *E. viminalis* or *E. hæmastoma* as both these Eucalyptus have a similar although variable bark.

The bark of this species, however, never has the horizontal "scribble" insect markings almost invariably occurring on *E. viminalis*, Labill., and *E. hæmastoma*. It has similary shaped leaves in all its stages of growth, whilst the sucker-leaves of *E. viminalis*, are narrow, cordate-lanceolate, sessile.

The fruits differ from those of *E. viminalis* in shape, rim, and direction of valves. The trees too are not found near water, as pertains almost invariably with *E. viminalis*, but on dry, stony ridges. It differs also from that species in the constituents of its oil.

It resembles *E. maculosa*, Baker, in the shape of the fruits, but differs from it in the timber, bark and oil constituents. It differs from *E. hæmastoma*, Sm., in timber, fruits, leaves and chemical consti-

tuents of the oil; and from *E. aggregata*, Deane & Maiden, in bark, fruit oil and habitat.

Its specific characters differentiate it from any of the other smooth-barked species. Of the rough-barked Eucalypts its fruits are often not unlike those of *E. fastigata*, Deane & Maiden, and *E. Smithii*, Baker.

The specific name refers to the copious exudation of a milky substance from the stem when the tree is cut at certain seasons of the year.

TIMBER.—A very pale-coloured, whitish timber, fissile, only used for fuel, much softer than that of *E hæmastoma.*

OIL.—The yield of oil was ·541 It is not a commercial oil at present, as it contains but a very small quantity of eucalyptol. No phellandrene is present.

The specific gravity of the crude oil was ·8826 at 15° C.; of the rectified oil ·8788.

The crude oil has no rotation, while the rectified oil had a rotation of 1° in a 100 mm. tube.

A sample of oil from this species, obtained from Charley's Forest Braidwood, was almost identical with that from Ilford in constituents and physical characters (H. G· Smith).

EUCALYPTUS POLYBRACTEA, sp. nov.

"BLUE MALLEE."

(Plate xlvi., figs. 7-8)

A glaucous Mallee, with quadrangular branchlets.

Leaves lanceolate (those on the early shoots lanceolate to oblanceolate) ,erect, rarely falcate, not oblique; narrow, under 6 lines broad, mostly 3 inches long, acuminate, often with a recurved point; midrib raised on the underside, giving a leaf strong resemblance to that of an *Olea* not shining; intra-marginal vein removed from the edge, lateral veins oblique, spreading, finely marked, only occasionally distinctly pronounced; petiole about 3 lines long. Oil glands very numerous.

Peduncles axillary, short 2-3 lines long, angled, with from 8-12 flowers. Buds in the early stage of development angular, surrounded *by numerous acuminate,* glabrous, ribbed, whitish *bracts*, short, 1 to 1½ lines long, glaucous. Calyx conical, tapering into an exceedingly short pedicel. Operculum obtuse, or only very slightly accuminate, hemispherical. Ovary flat-topped. Stamens all fertile; anthers parallel, opening by longitudinal slits.

Fruits hemispherical to pear shaped, 2 lines in diameter, glaucous; rim thin, slightly contracted, valves deeply sot, not exserted.

Hab.—West Wyalong (R. H. Cambage, L. S.),

This Eucalypt is one of the Mallees occurring between the Lachlan and Murrumbidgee Rivers, where it is known as "Blue Mallee," to distinguish it from its congeners.

The dried herbarium material is not easily separated from that of *E. viridis*. Baker, *E. Woollsiana*, Baker, and *E conica*, Deane & Maiden, as the fruits of all these species are almost, if not identical; but this Eucalypts differs principally from them in never attaining tree-form, and in respect of its floral bracts.

Other points of difference are the angular buds its glaucous character, shape of the leaves and quadrangular branchlets, whilst the most marked distinctive character of all is its oil, the yield and chemistry of which place it amongst the most valuable of our treos famous for the medicinal qualities of their oils.

Amongst other Mallees, it differs (1) from *E. gracilis*, F. v. M., and *E. dumosa*, A. Cunn., in the shape of the fruits and leaves, and the constituents of the oil; (2) from *E. oleosa* in the absence of the long, well-exserted valves, leaves and chemical constituents.

In botanical sequence it is placed next to *E. viridis*, as the fruits and leaves mostly resemble that speroies,

E. Woollsiana and *E. conica* have much broader leaves, and are classified amongst the "Box" group of Eucalypts.

Oil.—The oil obtained from this species is one of the best for Eucalyptus oil distillation growing in this colony. The yield of oil, obtained from material sent from Wyalong in the beginning of December, was 1·35 per cent. The crude oil was only slightly coloured, being of a lemon tint. The odour reminded one of eucalyptol, and volatile aldehydes are but present in minute quantities, Free acid and ester are also comparatively small. 91 per cent. of the crude oil was obtained boiling below 183° C., and this contained 57 per cent. eucalyptol; no phellandrene was present, but pinene was detected. The crude oil was slightly lævo-rotatory, due to the presence of aroamadendral (the previously supposed, cuminaldehyde). The specific gravity of the crude oil at 15° C. was ·9143, and of the rectified oil ·9109, this comparatively low specific gravity being due to the presence of such a small amount of constituents having a high boiling point. The specific rotation of the crude oil was [a] D—2·13° (H. G. Smith).

HORTICULTURE AT NUWARA ELIYA.

A VISIT TO MR. JOHN COTTON'S ORCHARD.

Probably barely one in five hundred visitors to Nuwara Eliya are aware that at the back of Lake View, the residence of Mr. John Cotton, may be seen the finest orchard in the island for wealth of imported fruit trees. It was in splendid condition the other afternoon, when the writer inspected it with ths proprietor.

"Never," said Mr. Cotton, "has my orchard so come up to the expectations I have all along had of it, as it has done this year."

Mr. Cotton's first attempt at growing English and Australian fruit trees was merely an experiment, but it has developed far beyond that stage now. Mr. Cotton began his cultivation with plums, and the parent tree of this species brought to Mr. Cotton from Australia by Mr. A. J. Kellow, of Albion estate, Nuwara Eliya, may now be seen in full growth and loaded with large and delicious-looking fruit, in clusters. the size of the well-matured fruit being about equal to that of the native lime. These plums are of a dark red colour when ripe.

THE MAJORITY OF THE TREES IN THE ORCHARD ARE PLUMS,

some of them being from three to four years old, whilst a few are seven years old, and they are almost all of them in bearing and well grown. The Red Heart plum plants from Mr. Cotton's orchard were in great demand last year, and this year provision has been made to meet requirements by a large supply not only of the Red Heart plum plants but also of other varieties. The Burbank Plum, of which Mr. Cotton had a large crop last year, does not seem to have quite come up to its past reputation this year The plants nevertheless are looking quite healthy, and Mr. Cotton thinks that in all probability the crop will come on later, as the plants were pruned and handled later than were the Red Heart. Mr. Cotton places his great hope in a yellow Japanese plum, which is now thriving very well, and a variety called the Kelsey Plum is also now in full bearing. Another blood red plum, (of a very large size, the largest plum in the orchard, as Mr. Cotton says) is just about to flower. Of other varieties of plum now being experimented with are the well-known Golden Drop, the Golden Heart, General Hand, General Sago, the Diamond and the Orleans. A few of these varieties are now being tried in the Nuwara Eliya Park, Mr. Cotton has in his nursery many one year old plants of the Red Heart and blood-red variety, both of which are specially recommended for easy cultivation and quick bearing.

APPLES, PEARS, CHERRIES AND PEACHES.

Mr. Cotton may well be proud of the brave show he has made this year with his apples. As with his other fruit experiments, Mr. Cotton's experiment in apple-growing was only a small one at the start. The first plant he put down was of the variety known as the Kentish Fillbasket, which was also brought to him from Australia by Mr. Kellow. The tree is now about 5 years old, with a growth of 6 feet, and it carries one single apple, ten inches in circumference, when measured in the presence of the writer. The fruit will in all probability be ripe in a fortnight more, and in all probability will be bigger then. Mr. Cotton says that this apple-tree took a long time to adapt itself to the soil, but now that it has done so it is rapidly growing up. Experiments are being made with other varieties of apples, viz., the Russet, the Emperor Alexander, the Beauty of Stoke and the Boston, and Mr. Cotton hopes soon to have plants of seven varieties for disposal to his *lientele.*

The fruiting season of the pear trees is not yet upon us, but the trees in the orchard are already covered with a profusion of white blossom. The pear, found everywhere almost in Nuwara Eliya, is what is known as the "cooking pear'; but Mr. Cotton has succeeded in growing and eating pear (Le Comte pear) which has at last borne a fruit, after a seven-years period of coaxing and attention.

THE AUSTRALIAN PEACH.

Mr. Cotton state that his experience with the Australian peach is that it grows very luxuriantly in Nuwara Eliya but bears unsatisfactorily. He seems to think that the peach bears better outside a radius of seven miles from Nuwara *E*liya. His trees are getting on as well as he could make them. Of cherries Mr. Cotton has many varieties, chief among which are the Verdus (a black cherry), the Waterloo, the Florence, and the Purple Jean. Several of these plants were imported lately and are already looking very vigorous. There are many varieties of young orange plants in the orchard, which are doing very well. Of the most successful varieties are the Washington, the St. Michael's the Rio, the Siletta, the *E*mperor Mandarin, are now being tried in the Nuwara Eliya Park, and Mr. Cotton expects to have some plants ready for sale by the beginning of next year. There are also about three sorts of lemons doing well in the orchard. One seven-year-old tree was practically loaded with as many as forty large size fruits. This plant like several others was also imported by Mr. Kellow.

THE CAPE GOOSEBERRY.

Another experiment the grower is very proud of is his Cape Gooseberry, which is in full bearing now. He has several other varieties of gooseberries (viz., the purple, the green, the red, the yellow and the white), but Mr. Cotton thinks that the cultivation of the Cape variety was a happy experiment. This does not signify that the other varieties (which are essentially English) are not doing well in Mr. Cotton's orchard. They were put down lately only, and not enough time has elapsed to prove the success or failure of the experiment, which is, according to Mr. Cotton, unique in Ceylon.

Mr. Cotton also has thres beds (60 feet x 30, 40 feet x 30 and 90 feet x 30) of straw berries in his orchard. The plants are in bearing at present, and as many as 20 pounds of fruit have been collected from these beds of a morning.

STRAWBERRY AND GOOSEBERRY JAM.

The writer was favoured with thre samples of jam made by Mr. Cotton from his strawberries, gooseberries, and tree tomatoes respectively. The jams were well prepared and tasted every bit as good as the tinned variety ordinarily met with. Mr. Cotton states that there is a demand for these jams, which he provides for by always having the jam ready in glass jars, sealed for delivery.

In a separate enclosure, Mr. Cotton has experimented on currants. He has four bushes here, all doing well and one bearing a small bunch of clusters. In this same enclosure are two grape vines (Muscat of Alexandria) trailing along frames attached to brick walls. These vines are from grafts imported from Australia. Another small vine has just begun to trail; this was produced from seed from the ordinary market grape. An apple tree in this enclosure (which was raised from seed from imported fruit) is 6 years old, but has not yet come to any good although it looks vigorous and stands about 3 feet high.

APICULTURE.

Mr. Cotton is of opinion that much of the success of his orchard depends on the beehives he has in it, the little insects helping materially in fructifying the flowers. There are two hives (in ordinary earthen pots and well-protected) in the orchard one of which is quite full of comb now.

FISH BREEDING.

A description of Lake View orchard would not be complete, if the writer omitted to mention that in addition to the above, Mr, Cotton has three ponds (connected by a small running stream) in one of which he rears a few trout, two of which are about 4 lb. in weight each; in the second pond he has twenty-four trout fry, averaging 1½ inches, and all doing well; in the third he had carp, but he has taken the last of these out.

Mr. Cotton's achievements unmistakably what well directed exertion can do, and his future experiments in fruit culture will be watched with the keenest interest by a growing section of the public.—*Local Times.*

ORNAMENTAL SEEDS.

Under the term of minor industries it has been proposed by Dr. Morris, in *The Agricultural News* of Barbados, to introduce new commercial plants, natives of other countries, but adapted for cultivation in the West Indies. In a recent number, in a paragraph on ornamental seeds, the writer says that "the present age is one in which there is a great demand for curios, and the increasing number of winter visitors to these colonies, should enable aged people and those who are only able to follow light sedentary occupations, to establish quite a small industry in mounting and preparing the ornamental seeds of the West Indies." It is pointed out that there are in the islands numerous seeds of an ornamental character, and that they deserve to be more widely known. It is, indeed, somewhat surprising that many of these seeds have not come more generally into European use than they have done, for they have always figured prominently among the exhibits at the several International Exhibitions of London and Paris, but mostly as ornamental beads, simply strung on strings for use as necklaces or bracelets, or perhaps for ornamenting table mats. Many of them are specially adapted for such purposes, but there are others that might well be used in a superior class of jewellery, in connection with which the following may be noticed:—Horse-eye beans. These are the seeds of species of *Mucuna*, chiefly those of *M. urens*, and they get their common name from the fact of their appearance being similar to that of the eye of a horse, though somewhat smaller. They are the produce of climbing plants of the tropics, belonging to the order Leguminosæ, and are well known to travellers, in consequence of the pods in which the seeds are contained being thickly clothed with sharp, stinging hairs, which are readily detached by the slightest shake. A familiar illustration of the annoyance caused by these hairs penetrating the skin is to be found in the allied species, *Mucuna pruriens*, which furnish the cowhage, or cowitch, of pharmacy, at one time much used as a vermifuge. The horse-eye bean,

when fully ripe, dries well and becomes quite hard. It has a brown, pitted, or rough surface, surrounded with a smooth, darker band. Divided in half, hollowed out; hinged and mounted with a gold or silver rim, these seeds make excellent appendages for watch-chains, or variously treated with similar mountings, they would form quite attractive bracelets. Similar results might be obtained with nicker beans (*Cœsalpinia bonducella*) There are also the produce of a leguminous plant, two or three seeds being contained in each pod, which is of a chocolate-brown colour, and studied with stiff woody spines. The seeds are about the size of a large Barcelona nut, irregularly globular, very hard, with a shiny surface, mostly of a greyish-slate colour, but sometimes yellow, orange nearly black, or even white. They are commonly used by the natives for making necklaces, bracelets, and rosaries. In India, where the plant is common, the kernel of the seeds is said to possess medicinal properties. The smaller seeds of the nicker, properly mounted and provided with a shank, might well be made into waistcoat buttons or ornamental buttons for ladies' dresses, as was at one time done in England with the soap berry seed. These are the produce of *Sapindus saponaria*, a small tree, the fruits of which are fleshy and about the size of a cherry, containing one hard, intensely black seed. The pulpy portion of the fruit shrivels in drying and becomes horny; it contains a large proportion of saponin, which is readily extracted by soaking in water, and is thus much used by the people for washing fabrics, as a lather is very quickly produced. The hard, round seeds are used for making necklaces, bracelets, buttons, and rosaries, and it is said that many years ago buttons were made of them, and used in England, chiefly for waistcoats. The absence of any figure or colour in the seeds, being a dull uniform black, does not recommend them for general purposes, but with silver mounts they would be particularly suited for mourning use. The intensely hard seeds of the Gru Gru palms, for the name is applied to at least two distinct West Indian palms, namely *Acrocomia sclerocarpa* and *Astrocaryum vulgare* are like the soap berries, black. They grow, however to the size of a walnut, and the centre being occupied with soft oily seeds, they can readily be hollowed in the form of boxes, or cut into buttons of different shapes and sizes, and as they take a fine polish should find some general application.

Amongst the brighter coloured seeds which should find a use amongst jewellers may be mentioned crabs eyes, furnished by a common tropical climbing leguminous plant (*Abrus precatorius*). The seeds are abundantly produced in small pods, and are themselves quite small, of a bright scarlet colour, with a black spot. They are very uniform in size and weight, the average weight being 1·75 grains. Wherever the plant is grown these very ornamental seeds are used for necklaces, ear ornaments, and personal adornment of all kinds, as well as for rosaries, and for decorating boxes, baskets, &c. Dr. Watt says the plant with its open withered fruits exposing the scarlet seeds is twisted round leafy boughs to simulate the holly at Christmas time at English stations in India.

It may be worth while saying that the seeds in the fresh state contains a poisonous property which is dissipated by boiling. Experimenting with the seeds of *Abrus* Dr. Warden is reported to have found that half a seed rubbed down with a small quantity of water and injected into the thigh of a full grown cat produced fatal effects in twenty-four hours. A seed almost identical in appearance, namely a bright scarlet with a black blotch but much larger in size, is that known as the Jumbi and produced by an allied leguminous plant, *Ormosia dasycarpa*. These seeds might well be used as a substitute for coral especially for necklaces and for mounting in brooches, as might also those of the coral tree (*Erythrina*) which are of coral red without the black spot. A still brighter seed also without the black mark is that furnished in India by *Adenanthera pavonina*, a large leguminous tree of Bengal, South India, and Burma. It is generally known as the Andaman redwood tree but sometimes as red sandal wood, in consequence of its use as a dye in substitution for the true red sandal wood or red sanders wood. The seeds are nearly half an inch in diameter somewhat lens shaped, that is convex on both sides and of the brightest shining red. In India they are often strung and made into necklaces, bracelets, and other articles of personal adornment. They are also used as weights in consequence of their uniformly weighing four grains. Their bright colour, hardens and uniform size caused them to attract the attention, a year or two ago, of a London West-end jeweller, who contemplated using them for brooches, pins, rings, &c.

That many of the seeds here enumerated, as well as others, are capable of extended utilisation cannot be doubted. Job's tears, the seeds of *Coix lachryma-jobi*, are by no means uncommon in the windows of fancy jewellers, made up into chains or bracelets, and there is no reason why there should not be a much greater variety of vegetable curios to choose from. Even with the job's tears, there are several varieties used in India that are still unknown in English commerce, and are only seen on native dresses, being used by certain tribes on account of their ornamental character. So long ago as the Colonial and Indian Exhibition in 1886, these seeds attracted much attention; and Dr. Watt, referring to them in his "Dictionary of the Economic Products of India," says, "They seem to stand a good chance of coming into use in Europe in the construction of artificial flowers, laces, bugle trimmings, and other such purposes for which glass beads are now used, and possibly also in Catholic countries, for the manufacture of rosary beads. If found capable of being dyed a deep black [or even brighter colours] there might be an extensive demand for them, since they would be much more durable than glass" so far as we are aware this anticipation has not been fulfilled, so that there is still an opportunity to establish a trade with these and other seeds, as for instance the so-called velvet seeds of British Guiana, referred to in the West Indian *Agricultural News**, which would make a good and novel trimming for ladies' dresses.
—*Journal of the Society of Arts.*

Coffee.—"Fertilizers and Coffee Cultivation, Addresses delivered before the United Planters' Association of Southern India, by Dr. Adolf Lehmann, Agricultural Chemist to the Government of Mysore, 1899-1902"—is the title of a useful pamphlet to hand today, published by Messrs Higgenbotham & Co, Madras. Coffee is, of course, a thing of the past in Ceylon; but from India over 200,000 cwt are still exported.

Flax in Ireland.—The Flax Supply Association report respecting 1901, that there was a substantial increase of one-sixth. The increased acreage under Flax in Ireland, as compared with 1900, is coupled with a very large yield of fibre per acre, the largest yield registered for forty-seven years, viz., very nearly 37 stone per acre. It appears that the Ulster returns were very satisfactory all round; whilst of Connaught it is stated that the 300 acres there grown gave the splendid crop of 49 9-10 stone per acre, larger than that of any foreign country. It is therefore to be hoped that the average may steadily increase from year to year. The total yield of the 55,000 acres under culture was close upon 13,000 tons, a larger produce than any of the previous five years, and about equal to that of 1895.—*Gardeners' Chronicle.*

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* The London agents for the publications of the Imperial Department of Agriculture for the West Indies are Messrs. Dulan and Co., 37, Soho-square.

SCHOOL GARDENS IN CEYLON.

The proposal to establish School Gardens in this Colony, and to make them a feature of future educational life, is worthy of encouragement. Being somewhat out of the beaten track of everyday instruction —which in most minds is associated with books, black-boards and slates—the idea of each school being possessed of a special province of its own where nature herself is to be the instructress, and where tender minds are to be gently led to exercise their powers and learn her secrets direct, may be considered by some to be a "fad"; but it has, at least, about it a graciousness which is winsome. The School Garden, although a new importation to Ceylon, has already a history and literature of its own. It is an established fact in many lands; a prized institution on the Continent and in America; and those who know most of it, and have carefully noted its working and effects, are among the advanced number who highly prize it as an educator, and would recommend its adoption everywhere. The idea, therefore, comes to us not untried, but as one which has been tested by many peoples: has established its footing not by ousting the well-known and venerated methods, or hustling itself into their place; but by a steady quiet growth which has won for it, approval and acceptance. It has been found to be radiant with much promise.

In the educational number of last month's New York *Outlook* there is an article on "School Gardens, their Development and Functions," which deals with the subject in an interesting way. Eighty years ago, the School Garden was first established in Austria and Swedeu; got official encouragement, and in both these countries it still flourishes. The Austrian Imperial School Law has this for its ideal in the matter:—"Where practicable a garden and place for agricultural experiments shall be established at every rural school." In 1898 there were over 18,000 School Gardens doing their work; while in some of the provinces in Austria there was not a school without a garden. In Belgium each school must have a garden of 39½ square rods. The Federal Government of Switzerland has begun to subsidise School Gardens, and to offer prizes for plans and essays on the subject. France has 28,000 primary Schools with Gardens attached. Germany has taken no official action; but in the different States the system is recognised and adopted. Russia numbers 8,000 School Gardens, and hatcheries of bees and silk-worms have been added. Neither Great Britain, America, nor the Netherlands have as yet done much; but America is moving, and, as the idea has "caught on," rapid advancement may be looked for and by the end of the present decade the United States School without a Garden will be the exception. In Scotland 45 years ago there was, at least, one famed educational establishment —The Dollar Institution—where School Gardens played their part and the Institution had then the unique place in Scotland of being recognised by the Government as a training centre for Indian Civil Service Candidates. Only in London and Dublin at that time could this needed instruction be elsewhere secured. Today the gardens are no more, and the prestige of the Dollar Institution is not now what it was.

Now, what is it that is claimed for the School Garden? It is held that it keeps the children more in the open air; that it substitutes, where possible, nature study for book-learning; that, while it does not pretend to teach the business of farming or horticulture, it tries to inspire a love for country life by a study of its phenomena. It trains to habits of accurate observation and elevates the mind in many ways. The radius of its influence is wider than the school. A wise principle is laid down not to attempt too much at once, and, while some of the American Schools have a plot for each scholar, others begin with but a single bank of wild flowers and ferns, the join property of the scholars. If School Gardens in Ceylon will but create a love of country life, what a gain that would be. Our educated youths are inclined to look down on rural work as beneath the dignity of their enligheneted souls—law medicine, and Government service being the openings they crave for—with the result that, while at the top of the profession there is always plenty of room, the rank and file are so jostled and hustled that life becomes in many cases a joyless grind, and sordidness at length quenches all its natural brightness. The prosperity of our Colony is based on successful Agriculture; and to have the educated rising generation taking an intelligent interest in it, and adopting it as a career for life's most strenuous efforts would be a very great gain for the island. When the Government takes to the distribution of new economic plants—as from time to time it has done in the past—the success of the experiment would be assured, if the new importations were reared and tended by people who knew something of plant life and whom early training had bent their minds in that direction, rather than if they fell into the hands of the ignorant and untrained. The Russian addition of Bee-keeping might well be adopted, when feasible, as an adjunct to the School Garden: becoming a source of revenue as well as an object lesson. Doubtless there would at first be some difficulties, and experience might have to be bought at a stinging cost; for our Ceylon bees have not yet, we believe, been domesticated—unless by Mr. Frank Benton, Apiarian, America, from the specimens he collected and took away over 20 years ago,—nor does it "improve the shining hour" for man's benefit. Still there is much first-hand information on apiaries easily accessible, and Bee-cultivation has been reduced to an almost exact science, so that an intelligent teacher, who elected to supplement his School Garden with a bee-hive, would soon find his way about, and have in his School compound a theme intensely interesting to young people, redolent of life as well as teeming with valuable instruction.

A COMPRESSED (WHOLE LEAF) TEA SYNDICATE, LTD.

The above new Company has been registered in England, and we take the following from the *Investors' Guardian*, August 9:—

Compressed (Whole Leaf) Tea Syndicate Ltd, (74,493),—Registered July 29, with capital £1,000, in £1 shares, to adopt an agreement with W Gow and J H H Rolfe, to buy, sell and deal in tea and other products and substances, capable of being dealt with by the invention for an improvement in the manufacture of compressed tea, mentioned in such agreement, and to carry on any business incidental or auxiliary thereto. No initial public issue. Begg, Dunlop and Co., of London. are the managing agents. Registered Office, 138, Leadenhall St, E.C.

INDIAN PATENTS.

Applications for the under-specified inventions have been made:—

No. 267 of 1902—Rakhal Dass Khan, rice miller Ramkristopur, Howrah. A mill for husking rice finally' so as to make it suitable for use as a food-grain.

No. 268—Rakhal Dass Khan, rice miller, Ramkristopur, Howrah. A paddy-boiling apparatus.

No. 269—Rakhal Dass Khan, rice miller, Ramkristopur, Howrah. A mill for drying paddy and other food-grains.

No. 271—Basrur Brothers & Company, merchants and agents, Hanawar, North Kanara district, Bombay presidency, British India. Manufacture of a new product from the Talipot palm.

No. 288—David James Young, plumber, of Patea in the provincial district of Taranaki, in the Colony of New Zealand. An improved portable shower bath.

No. 290—Henry Mathew Alleyn, tea planter of Meria Cotta, Maskeliya, Ceylon. An improved manurial mixture for tea cultivation.

No. 308—Edward Daw Mashiter Cooper, conservator of Forests, Madras. Improvements in the fastening of doors, windows and the like.—*Indian Engineer*, August.

A USEFUL TREE FOR THE HIGHER PLANTING DISTRICTS.

Mr Nock writes that he has had a specimen sent him of the tree growing on an Agras estate, Dimbula, supposed to be *Ailantus glandulosum*; but which he (Mr N) thinks is rather *Acrocarpus fraxinifolius*, a tree from India. Mr Nock has sent the specimen to Peradeniya to be verified, so the result will soon be known. Meantime here is Dr. Watt's account of the tree known as the red or pink cedar of tea planters, which we believe with Mr Nock must be the tree growing on Glasgow:—

ACROCARPUS FRAXINIFOLIUS, *Wright; Fl Br Ind, II*, 292; *Wight, Ic, t.* 254.

RED OR PINK CEDAR of (tea-planters).

VERN.—*Mandama*, NEPAL; *Mad ing*, LEPCHA; *Malai-kone*, TINNEVELLEY, *Kalinji*, NILGHIRIS, *Kilingi*, BURGHERS, *Hantinge. belanjihavulinge*, KAN.

HABITAT.—A lofty deciduous tree, found in the Eastern Himalaya and lower hills down to Chittagong, ascending to 4,000 feet, also in South India and Burma.

STRUCTURE OF THE WOOD.—Sapwood white, heartwood light red, moderately hard. Weight 39 lb per cubic foot.

Used by Planters in Darjiling for tea-boxes and planking, in the Wynaad for building and furniture, and in Coorg for shingles.

In the *Tropical Agriculturist* for May 1883, some interesting information is given regarding wood for tea-boxes. Mr Bruce writes: "I have used this timber more perhaps than any other for tea-boxes and tea-house furniture in general, and if it had been well seasoned it is as good a wood as could be procured for the purpose."

Dr. Watts' extract from the *T. A.* probably explains how Mr A L Cross came to introduce this tree. In the very early years of "tea" here, we had a very carefully written essay on tea culture, prepared for us and published in our daily and monthly by Mr Bruce, an experienced Nilgiri tea planter, and it was no doubt on seeing his recommendation as given above that Mr Cross first got seed of the tree in question. The wonder is that *Acrocarpus fraxinifolius* is not grown more freely upcountry.

LIQUID FUEL FOR STEAM ENGINES.

We are informed that the Steam Engines of Messrs. Clayton and Shuttleworth—for which Messrs. Walker and Greig are Agents —work equally well with all petroleum having flash points from 82° to 240°. The conditions of working with the heavier oils require that the engine be altered slightly to secure economy with the liquid fuel, but these alterations are not an expensive item. Messrs. Walker and Greig have at present a 7 horse-power engine at work with liquid fuel at their Glencairn Works, Dikoya. But before the firm can give any advice on the subject of driving under these circumstances, they intend running the engine for one month on the new fuel, in order to be able to judge of its merits or demerits on all points.

RAILWAY TRAFFIC IN PLANTAINS.—A morning business visit to the Railway Goods Department at the main station—the approach road to which by the way is in an atrocious state—will generally reveal half a-dozen bullock carts being loaded up with green plantains; and from the intelligent Goods Clerk we learn that on an average 10 loaded waggons, chiefly from Rambukkana, Polgahawela, Ambepussa and Mirigama, arrive daily. Each waggon has probably 500 bunches, and each bunch averages, perhaps, 30 large plantains—so that 150,000 plantains (or one for each inhabitant!) come into the city by this route alone. Probably if the supplies received from the Cotta, Negombo and other sides were added, the total would be very much increased. A traffic in fruit from native gardens between Colomb and Avissawella ought to form part of the Kelani Valley Railway traffic, and the cultivation should be extended to meet the demands of a ready market as the result of railway communication.—We have been told since by native authorities that there are more like 100 to 150 plaintains on each normal bunch?

CINCHONA BARK AND QUININE: JAVA SWAMPING THE MARKET.

(C M & C Woodhouse's Circular, 21st August.)

On the 16th instant the exports of Bark from Java for first half of August were cabled as 1,227,000 Amst. lb.! As this quantity would have been considered heavy for the whole month, the question asked everywhere is, "What does it mean"? In the hopes of getting Planters in Java to keep the market supplied with moderation and to avoid excessive harvesting of Bark which must end disastrously to all concerned, we think the following statistics may be found useful as showing roughly the position at the end of last year:—

	1901. Eng. lb.	1900. Eng. lb.	1899. Eng. lb.
Imports of Bark into U.K. & Holland	18,208,000	15,770,000	16,321,000
Exports of Bark from U.K. & Holland	15,271,000	16,243,000	15,828,000
	+2,937,000	—473,000	+493,000
Estimated Bark consumed by English and Dutch Manufacturers	2,000,000	2,000,000	2,000,000
Estimated difference in Stocks of Bark in London and Holland	+937,000	—2,473,000	—1,507,000
	Ozs.	Ozs.	Ozs.
Quinine equivalent at 4½ per cent.	+675,000	—1,781,000	—1,085,000
Increase in Stocks of Quinine in London during the year	201,000	563,000	997,000
Estimated difference in Stocks of Bark and Quinine	+876,000	—1,218,000	—88,000

From the above it appears that, owing to the increased supplies of Bark from Java, the Production was last year in excess of the Distribution, but this would not have mattered much in view of the large reduction in Stocks during two preceding years, if consumption had been maintained, but the feature for some months past has been the large falling-off in Imports of Bark and Quinine into United States. Estimating the Bark as containing 4½ per cent. Quinine on average, the Imports of Bark and Quinine into United States compare as follows, viz.:—

	1901/2. Ozs.	1900/1. Ozs.	1899/1900. Ozs.
1st July to 31st May	5,227,000	6,683,000	6,193,000

Now it is not likely that actual consumption has fallen off to anything like the above extent, but it is unfortunate that, when the market is suffering from a diminished trade, the exports from Java should show a tendency to increase. We trust that the Planters there will be warned in time, as the future is almost entirely in their hands.

QUININE.—During the earlier part of the month the market was steady at 10½d to 10¾d per oz., with a moderate business doing to the Trade. This week, however, after the heavy Bark shipments were known, prices gave way 1d to 1½d per oz., and considerable sales were made at 9¼d to 9½d per oz. on the spot. The further decline again brought in buyers and there has since been a firmer tone, the latest quotation being 9¾d to 10d per oz.

MANURE COFFEE.

I have before me a pamphlet by Gustav Helmrich on experiments in manuring coffee in Guatemala. It shows the perseverance, determined effort and scientific attention of a coffee planter amidst difficulties such as hail and rain that measured 180 m. in 2 hours and resultant landslips that carried away fair-sized fields.

Besides various conclusions come to concerning green manuring, weeding, etc., he lays stress upon the necessity for a well-balanced, complete manure. He prefers for good soil, or for land where natural manures are employed, a fertiliser containing

Phosphoric acid	8
Potash	.. 13
Nitrogen	.. 4

which should be used, not for each tree but for the whole field. With green manuring a fair supply of cheap nitrogen is obtained, but phosphoric acid and potash are wanting and should be supplied. Phosphoric acid increases the yield, but when it is in an easily soluble form the greatest care must be taken, for, if given in quantities too great, it forces from the tree one or two large harvests only to rush it to certain death unless a heavy nitrogenous manure is employed as an antidote. Potash acts on the wood and leaves. The coffee plant stands greatly in need of potash. When this fertiliser is not used the want is immediately noticed in the tree. Nitrogen shows its effect in strong fleshy branches of fruit wood, dark leaves and slow ripening. Lime unites for a short time the action of potash and phosphorous, the stout, long woody appearance resembling the effect produced by potash while the disintegrating effect upon the soil and the early ripening produced resemble the action of phosphoric acid. The usual course in fertilising is to wait till the impoverishment of the soil is patent to the naked eye, generally after some years, when the coffee roots have penetrated to a soil that starves them. As to the manner of manuring I think the advice is sound, and the only rational one is to fertilise the field as a whole and not the single tree. If a part of the plantation is lost, and dying trees unfortunately show in different places, the point for decision is whether the whole must be given up or the whole maintained, and the only way to keep the vacant spaces from increasing year by year is to grow green manure on them and to keep the whole field equally well manured.

As far as I have seen, great faith is held in superphosphates and the quickly acting and as quickly lost saltpetre, but few planters resort to a steadily acting, well-balanced complete manure such as a mixture of bone meal and potash with stable manure or poonae.

Ranipet, 21st Aug. JOHN KENNY.

—*Madras Mail*, Aug. 27.

COLOURED AND UNCOLOURED GREEN TEAS.

To the Editor "Home and Colonial Mail."

SIR,—Mr. Robert Hart's able letter in your issue of the 19th July should set at rest the many misconceptions that have grown up on this subject. It cannot be too widely known among British planters and Directors of Companies that green teas, on whatever system they are made, come out coloured, or uncoloured, according to the style of the final firing. If this is carried out on the ordinary hot-air drying machines, the tea will assume the olive colour that has misled some tea experts into calling the Ceylon green teas made in this manner "Oolongs" or "Namunas," which they cannot be, for these descriptions are semi-fermented, whereas the Ceylon green teas produced on Mr. Drummond Deane's well-known system are entirely unfermented. The

colour of these answers to the colour of the Japan basket-fired green teas, which are also dried by a current of hot air, and passed on to the consumer without any colouring or finishing process being attempted. On the other hand, if the firing or drying operation is finished on hot pans, they will assume the desired green grey colour in the dry leaf. The Far East tea finishers, generally handling the tea when it is old, are obliged to add colouring matter to obtain the desired colour. On Indian gardens where the tea is finished *in situ* it may be coloured pure, for it will take colour without colouring matter when it is fresh, but only when it is fresh.

The advantage which Mr Deane's system of green tea making has over all others lies in the facility with which large quantities of leaf may be rapidly handled. It is not too much to say that the company, to which Mr Hart alludes as making coloured teas by the aid of Mr Drummond Deane's machine and system, could never have taken up the contract to produce 200,000 lb. of coloured green tea for the Indian Tea Association, and now 160,000 lb. more at half bonus after experience of the cheapness of green tea production on this process, if they had not had Mr Deane's machine and process to rely upon to produce the green tea, from which, by a final firing, they make the coloured or finished article. Mr Drummond Deane by his invention has indeed introduced as great a revolution into green tea making as was effected by the first machine rollers and dryers in black tea. If we are now in a position to compete with China and Japan in the matter of green tea, as the experience of Mr Hart's company shows that we are, it is entirely due to Mr Drummond Deane; who has made it possible to produce the uncoloured green tea, from which the coloured tea is made by the finishing process, cheaply enough to give us a chance on the market. In later days the tea industry and its promoters will come to recognise the immense debt it owes to Mr Drummond Deane, who has rendered green tea, coloured or uncoloured, on a large scale possible in India and Ceylon.

At the same time there is something to be said in reply to Mr. Hart on the subject of uncoloured green teas. These, it is now admitted on all hands, are as truly "green" in character as the coloured variety. Indeed it would be absurd to contend to the contrary, for it is from these uncoloured greens that the others are made. Mr. Hart, however, contends that the colouring process adds quality, developes the liquors and matures them, and that the process is necessary to enable British growers to compete against the Far East teas. If the colouring process is so necessary, how is it that some of the best Japan teas are not coloured or finished in the manner described? I allude to the "basket-fired" teas of Japan, which are in great favour in America. These "basket-fired" teas are dried in an apparatus by a current of hot air, corresponding to the drying machine with which the uncoloured green teas of India and Ceylon are fired. Their colour in the dry leaf is an olive brown or green very similar to the colour of our uncoloured teas. I have not heard that the trade considers that these Japanese "basket-fired" green teas are not "true" greens or that they show any deficiency in liquor or that they require further "development" or "maturing." I understand that they are well thought of by dealers and consumers.

I do not hold a brief for uncoloured green teas, but I think it useful to suggest that there should be no dictation to tea makers which kind of tea, coloured, or uncolored they are to make. It is a well-established fact that uncoloured green teas are going ahead well in Canada and that the demand for them is increasing both there and in the States. It is immaterial if the States' buyers, as suggested, buy them for the purpose of colouring, so long as they *do* buy them. For that matter, they do the same with Japan teas at seaport towns of Japan, for the Japanese do not make coloured teas on their gardens; it all has to be coloured by the buyers after purchase. The point to be considered is that, the demand being in this manner assured, it is a matter of personal convenience with tea producers which style they shall go in for. The price obtainable for the coloured tea is certainly higher, but the process again is more costly and in many instances the margin between cost and price will not show to advantage compared with the margin between cost and price of uncoloured teas. Possibly in some cases it will be equal and in a few, where the manufacture is taken up on a large scale, the advantage may be on the side of the coloured greens. But most concerns will not care to pledge themselves to a very large output at first or incur the expense of installing more plant than absolutely necessary. It would therefore be a hindrance to the movement to rule out uncoloured green teas from the advantage of the Association's aid, especially as the demand for it is well sustained. Even if it is bought for the purpose of colouring, it is so much off the black tea market and so much more British-grown tea gone into consumption and so a clear gain.

This I write without prejudice to the movement to produce coloured greens, answering to Japan and China teas, which deserves all encouragement and support. Speaking from personal knowledge I may say that a good many of those who are now producing uncoloured teas on the Drummond Deane system are experimenting with a view to colouring their teas before they leave the factory and, if they find that they can economically carry out the process, will adopt it; but if any hasty action against the manufacture of the coloured teas is taken, they will probably drop green tea for good.

PERMANGANATE OF POTASH AND MOSQUITOES, &C.

Here is the exposure to which our Correspondent "E. E. G." recently referred:—

"Other substances have been experimented with. Two years ago many newspapers contained an item concerning the use of permanganate of potash. As this item was credited to the Public Health Journal it gained a great deal of credence, and was afterwards mentioned in an interesting article by Mr A C Weeks, in the Scientific American. The published note read as follows:—

Two and one-half hours are required for a mosquito to develop from its first stage, a speck resembling cholera bacteria, to its active and venomous maturity The insect in all its phases may be instantly killed by contact with minute quantities of permanganate of potash. It is claimed that part of this substance in 1,500 of solution distributed in mosquito marshes will render the development of larvæ impossible; that a handful of permanganate will oxidize a 10-acre swamp, kill its embryo insects, and keep it free from organic matter for thirty days, at a cost of 25 cents; that with care a whole State may be kept free of insect pests at

a small cost. An efficacious method is to scatter a few crystals widely apart. A single pinch of permanganate has killed all the germs in a 1,000-gallon tank.

"The item is so obviously ridiculous upon its face that it would hardly seem worth while to make any attempt to refute its statements. Nevertheless, it has been so widely read that definite experimentation seems necessary to set the matter at rest. The unknown author's ignorance of the life history of mosquitoes in the opening sentence need not necessarily imply that he would not know a good remedy if he found one. Careful experiments were undertaken by the writer in July, 1898, with various strengths of permanganate of potash in water containing mosquito larvæ from one to six days old. It was found that small amounts of the chemical had no effect whatever upon the larvæ, which were, however, killed by using amounts so large that, instead of using a "handful to a 10-acre swamp," at least a wagon load would have to be used to accomplish any result. Moreover, after the use of this large amount and after the larvæ were killed, the same water, twenty-four hours later, sustained freshly-hatched mosquito larvæ perfectly, so that even were a person to go to the prohibitive expense of killing mosquito larvæ in the swamp with permangnate of potash, the same task would have to be done over again two days later. The same conclusion was subsequently reached, after careful experiment, by Dr Lederle, of the New York health office, and by the Italians Celli and Casagrandi."

HOME-MADE JAMS IN INDIA.

(*By a Mem-Sahib.*)

Reading an article in a late Home paper on the subject of "Preservatives in Food," I saw in it these words: "Mr Blackwell, though he does not put preservatives in jam, allowed that it would be useful to do so, and the chemist to Messrs. Keiller said that the makers who use preservatives have a great pull over the rest."

Preservatives or not, it seems to me only too true that of late years *all* tinned jams have deteriorated so far as keeping qualities go, for nowadays a tin often ferments and has to be thrown away after being open for less than a week, and I have even opened a tin in which fermentation had already started. This, from my own experience, I attribute largely to the use of beet sugar, with which all markets are now flooded, thanks to the bounties of foreign Governments, and to our own policy of letting the products of our Colonies slide without any help, when their trades are killed by such unfair foreign competition.

I have been out here many years now, more than I care to think about, and have always been keen on my own jam-making, having been brought up in an old-fashioned way, and having been taught to be proud of making my own preserves when one can rely on the materials being what they profess to be, the sugar being cane, and no preservatives used, except the good old-fashioned ones of care and good boiling. I allow it takes time and trouble to see to things oneself, but out here most of us Mem-Sahibs have time and enough to spare, and we surely may still take pride in such things. For years one has known that the staple of most tinned jams is anything but the fruit of which the name on the label leads one to imagine one is eating; carrots, turnips, pumpkins, etc, are all requisitioned, and quite lately I was told by a man in the trade that common figs are largely used in strawberry jam, to give the necessary seediness. In every trade recipe gluoese, which is I believe a product of coal, etc., figures largely to give stickiness and sweetness, with the use of less sugar, and less wastage from long boiling. These things are all doubtless good in their way, and one would not complain were they sold under their true colours, but I, myself, very much prefer to know what I am eating, and as my products seem appreciated by my guests, to judge by the consumption of them, perhaps some of my treasured recipes may be useful to others.

Of fruit in this country we have ample store, and ridiculously cheap, as compared to Home prices cane sugar can easily be got by buying direct from one of the big cane mills, and servants are willing; so on the score of economy, too, home-made jams are to be recommended; but to ensure success, strict personal supervision is necessary, unless one is lucky enough to have a servant one can implicitly trust. I find there are two items specially in which they want looking after: they *will* put too much water to the fruit, because "Missis only liking plenty jam coming," quite ignoring the fact that the water has to be boiled away or the jam will go mouldy or ferment; the other is that they have not the ghost of an idea what "simmer" means. If left to them the jam will boil furiously whilst the maty is energetic enough to blow up the fire, but energy and fire soon die down, and then the jam goes almost cold. Either a good oil stove or "Primus" is far the best for this work, as then you can regulate the heat to the exact amount required. Bearing these two facts in mind, and also that the fruit must be sound, ripe and dry, and the sugar *cane*, I pass on to some recipes.

First comes Cape Gooseberry Jam, which I consider the king of Jams, bar none. Take the fruit out of the hulls; wipe carefully to free from dust, rejecting all green ones. Weigh; prick each two or three times with a silver fork, and put all into a preserving pan of which the bottom is *just* covered with water; this prevents the fruit from catching, which it is very apt to do. Set aside ¾lb of sugar for every lb of fruit. Let the fruit come slowly to a boil alone, stirring it carefully and gently with a wooden spoon. When it boils slack it off: add half the sugar and let it come gently to a boil again; slack it off again; add the rest of the sugar, and the juice of two or three limes for each lb of fruit. This depends on individual taste. Simmer slowly, stirring all the time till the juice sets on a plate. If you care to boil it longer it will jelly, and you can turn out the jar as a pretty golden shape, when cold.

The juice, strained from skins and seeds, weighed and on equal quantity of sugar allowed boiled to a jelly makes a delightful preserve for children, with whom seeds in jam do not as a rule agree.

Guava Jelly. Pare and core any number of ripe guavas. Those with pink flesh make a prettier coloured jelly than the white, but the flavour is identical. Put in a preserving pan with enough cold filtered water just to cover the fruit completely. I advice you to see it put over yourself or the servants will put in far too much. Stew gently with the cover on the pan, for about 6 hours, or until the fruit is almost dissolved. Here again, if left to himself, Rama

swamy will gallop the pan with the cover off, and in consequence the fruit will not boil to a mash, and you lose a lot of the juice. When quite pulpy strain it through clean flannel, wrung out in boiling water, or a thick *jharun* ; it must be left to drip and not be helped by stirring with a spoon. I usually leave mine in a safe place to drip all night. Weigh the juice ; to every lb. allow 1lb of best white cane sugar, and the juice of three limes. Let it simmer till it jellies, skimming carefully. One time when I failed I found my sugar was beet-root, as I did not then know its evil propensities.

Guava cheese, for dessert, is very good, made with the pulp, put through a sieve to free it from seeds, an equal weight of sugar allowed, and a tea cup of juice to every lb of pulp. It should set and turn out in a rich deep red cake.

On the Hills splendid sour oranges are to be had and there are quantities of recipes for marmalade. I have my two favourites, one of which is a clear jelly with the transparent chips set in it very good to look at and still more so to eat. Cut the fruit up raw very thin, white and all together, only taking out the pips. To each pint of fruit add 3 pints of cold water; let it stand for 24 hours. Then boil gently for some time till quite tender, so that a straw will pierce the chips quite easily. Leave it till next day. To every lb of boiled fruit liquor and all add 1½ lb white cane sugar ; bring it slowly to a boil and until the syrup jellies and the chips are transparent. Boil the pips with about two big cups of water till reduced to about half, and add with the sugar ; they help jelly.

Another kind, not jellied. To each lb. of sour oranges put 2 quarts of water, and boil the whole fruit for two hours, or till quite tender. Then cut all up into thin slices, taking out the pips. To each lb. of cut up orange add 2 lb. of best white sugar, and 1 pint of the water in which the fruit was boiled. While you are cutting up the fruit pour the water on the sugar, and let it stand to dissolve in the preserving pan, off the fire. Add the fruit and boil all together briskly for half-an-hour, or till the juice gets syrupy.

Here we have a little fruit in our gardens, called "Mock Orange." The bush is small, with tiny dark green leaves like a miniature orange tree, and the blossom is white and has an orange blossom scent. The fruit is about as big as a small marble, a dull deep red when ripe, and is a funny flavoured pulp round a big stone. It makes rather a fascinating jam which has quite a distinct flavour to any other. Wash the fruit in hot water, take out the seeds, boil till tender, in enough water to cover it, and then pass through a sieve ; to each lb. of sieved fruit allow ¾ lb. of sugar, and simmer together till it gets thick. It has an acid flavour, and some prefer an equal weight of fruit and sugar. A very little grated spice can be added if liked, but I dislike spice in jam myself. This a beautiful rich red-coloured jam and well worth trying.

Now we come to mangoes, the fruit, *par excellence*, of India. Jam and jelly made of ripe and green fruit are all excellent.

Green mango jelly. Common ones will do, *faute de mieux*, but good graft ones are best. Peel, cut and stone the fruit. Put each piece as cut into water slightly acidulated with lime juice, or it will discolour. When all is cut up fairly small, drain dry and put into a preserving pan, with just enough water to cover it. Put on the lid, and let it simmer, as for guava jelly, but the fruit being green takes much longer to get soft and squashy. When quite pulpy let it drip through flannel, but do not squeeze it at all. Weigh the juice, allow 1½ lb of sugar to every lb of juice and boil together till it jellies.

If made from ripe mangoes, only use ¾ lb of sugar to each 1 lb of juice, and the first boiling will not take very long. When cutting the ripe fruit, too, do so over the preserving pan, to save all the juice, and do not put the pieces into water until you are going to boil them.

Jam from green or ripe mangoes. These are made alike, only the green wants more sugar. Grate or cut up the fruit after peeling and stoning it. Boil gently till quite soft or pulpy, and all in a mash ; if preferred it can be put through a sieve. Weigh, and to every 1 lb green mango pulp allow 1¼ lb sugar. If ripe fruit is used only ¾ of a lb. Simmer gently till thick.

We have another fruit, called "Bilimbi" in our part, something like a long, sweet water grape to look at, but very sour, and yet it makes a nice flavoured jam. I wash it carefully, as it gets very dusty ; grate it on a grater, and allow 1½ lb sugar to every lb of fruit ; boil all together till stiff. It turns a dark brown and is very nice for a change.

What can be nicer than pineapple jam? This wants special looking after, or, in his zeal to please Missis with quantity, Ramaswamy will sacrifice quality by cutting up the hard cores and putting in all the eyes, to the great detriment of the jam. See that the fruit is ripe and quite sound. Peel, cut out all the eyes carefully, and discard the cores. Either cut up all very fine, or grate each slice on a big bread grater to the core. Weigh, allowing ¾ lb of sugar to every lb of fruit. Put a large breakfast cup of water in the pan, add the fruit and the juice of two or three limes to each lb. and simmer nicely till reduced ; as it is very watery. Then add sugar and boil together till nice and thick. For children I make jelly by boiling the fruit till in a mash, then straining, and then boiling the juice with an equal weight of sugar till it jellied.

People who live on the Hills can make jam and jelly of any fruit they can get, on these lines, as a very little experience tells one what quantity of sugar to use.

Jam made from the edible passion fruit is excellent too, and a great institution at the Cape. Pick the fruit from when quite ripe and purple. Peel off the outside skin with a sharp knife ; cut the fruit in halves, scoop out the insides and place them in a bowl. Stew the outsides with water just to cover them, over a slow fire, for about 12 hours or till tender ; being woodeny they take a long time. Add the juice of two limes to every 12 fruits. Strain the insides from seeds and add to the stewed shells, allowing 12 insides to every 12 shells, and ½ lb. sugar for this quantity. Boil together till very thick and syrupy. It is something like apricot jam and very much the same colour.

Plantain jam is much liked by children and is easy to make. The fruit soon softens with boiling I always sieve it. Add ½ lb. sugar to every lb. of pulp and the juice of two limes. Boil together till firm ; it often turns quite a pretty pink.

Plantain jelly, too, is nice. Take some large coarse very ripe plantains, about 30, wash them well ; add 4 pints of water and boil for two hours, uncover, Strain, but do not squeeze. To eight

cups of the juice allow five cups of sugar and the juice of three limes: boil till it jellies. It is not clear, but a nice red colour. If a few guavas, about six big ones, are added to the plantains and all boiled and strained together, it makes a nice variety.

A savoury tomato jelly to eat with meat is not much known. To each lb. of tomatoes allow 2 oz. sugar. Melt the sugar, stirring all the time, taking care it does not burn. Into this put two or three Bombay onions cut up very fine, for each lb. of fruit, and boil up nicely. Add the tomatoes cut up fine, a little pepper and salt, and if liked, some spice. Boil all to a pulp, strain, and then boil up the juice till it jellies. Put into *small* pots, as it does not keep well when once opened.

Sweet loose jacket oranges make delicious marmalade too. Scrape the skin slightly and boil till very tender; cut up all, only taking out the pips and allow ½ to ¾ lb. sugar to each lb. of fruit. Simmer till nice and thick. This is more like a jam, being sweet, as maramalade is always slightly acid.

Roselle jelly is too well-known to require any describing. This is a fascinating subject, but I have run on longer than I intended and yet have not added any recipes for preserves for dessert, of which I have several. They may do for another article.—*M. Mail*, Sept. 6.

PRODUCE AND PLANTING.

We remark on Mr George [Seton's interesting table of tho working of forty-five

INDIAN TEA COMPANIES

for the past season. It will be seen that about half of these companies show increased profits, as compared with the previous year, while the other half have had their profits reduced. Taken all round, the profits wero larger than in the previous year, but the amount distributed in debenture interest and dividends was much smaller. The total nett revenue works out at £319,000, as against £297,600 in the previous year, and the average rate of dividend, including debenture and preference interest, is 2.72, as against 3.90 per cent. This lower return, in spite of bigger takings, is not due altogether to increased capital on which distribution has to be made, but may be attributed to the more cautious policy of the directors in keeping larger sums in hand, so that whilst the aggregate capital has only grown 4 per cent, and is accounted for by the fresh issues of four concerns, the total sum placed to reserved and carried forward has expanded more than 15 per cent. The production per acre fell from 487 lb to 421 lb, but the profit per lb increased from 0.85d to 1.03d, and the sale price was nearly a third of a penny per lb better. The ratio of operating expenses to receipts was 86, as compared with 88 per cent, and the profit on the total capital employed is equal to 3·50, as against 3·20 per cent. The situation revealed by this carfully-compiled table is that each garden or group of gardens should be considered by itself, and that it is difficult to generalise on the whole industry from the results of any particular working.

The Government Laboratory report, states that COFFEE substitutes are admitted free provided they contain no coffee or chicory. Needless to say, there is no lack of such substitutes. Roasted figs, turnips, acorn and dandelion are the favourites. This must be particularly gratifying to coffee planters. It appears that molasses form an ingredient of soy, cattle foods, and blacking, and these are now charged a shilling per cwt in respect of the sweetening matter in them.—*H. & C. Mail*, Augst, 29.

FRENCH-GUINEA RUBBER.

Captain Cromie, His Majesty's Consul at Dakar, in his Report on the Trade of French-Guinea for 1899 and 1900, which was not received at the Foreign Office until July 21 last, deals with a subject of much interest to tropical Colonies—the collection of rubber. The fall in the price of rubber in 1900 was especially felt in French-Guinea, eight-tenths of whose exports consist of that article. And there were special reasons which caused the Colony to suffer. "Having been a rubber-producing country for many years," says the Consul, "the vines, owing to wasteful methods of tapping them, had become comparatively scarce, and in order to increase the quantity of rubber for sale, the natives adulterated it in various ways. The merchants, anxious to profit by the high market, accepted the bales without examination, with the result that the rubber bought from the natives during the season 1899-1900 contained as much as 25 per cent. of impurities. The home markets, who could obtain rubber of a much higher quality from other sources, refused to buy the Guinea rubber, which thus remained on the hands of the merchants, who, in many cases, were compelled to sell at a loss. In the meantime European goods were accumulating in the merchants' stores at Conakry, as they had given their orders before the fall in prices. But the natives, alarmed at the low prices they were offered for their rubber (50 per cent less than the year before), only sold enough to pay their taxes and to such European articles as had become indispensable to them. As they had long ceased to cultivate anything but rubber, the fall in that article found them with nothing to replace it. The Government has adopted several measures which, it hopes, will remedy this state of affairs, so as to improve the quality of Guinea rubber. A Decree was issued in May, 1900, forbidding the sale of rubber in unopened bales. This has already had a good effect, as the natives, finding they were certain of detection, ceased adding foreign matter; but as the method of coagulating the rubber in calabashes ordinarily employed by the natives made it difficult to detect adulteration with resins, a further Decree was issued to the effect that, dating from the wet season of 1901, the only rubber allowed to be exported would be that prepared by the Foulah method, in red filaments, which was found to be the only one which permitted the detection of resinous adulteration."—London *Times*.

CEYLON TEA IN AUSTRALIA.

(From an ex-Ceylon Resident.)

Melbourne, Sept. 3.

I advised you by last mail of the Regulations which must now guide Colombo Exports of Tea to the Commonwealth. I feel I must, however, send you a line by this, to show you how acute the situation has become between the Importers whose tea has been seized, their sympathisers and the Minister of Customs. Sir Malcolm Mc Eacharn, who has been very dissatisfied with the new regime at the Customs ever since the fuss over the breaking of ship's seals, has told his constituents, he can no longer be looked upon as a supporter of the Government. Though his interests are *shipping*, it was over some remarks of his that the House discussed the Tea difficulty the other night. In one of the recent issues of the *Observer apropos* to tea stealing, you make the very pertinent observation, that "if there were no receivers there would be no thieves." Now, I hope you will persevere on your text that, if there were no

EXPORTERS OF FAKED RUBBISH

from Colombo, there would be no importers in the Commonwealth of any article or grade bear-

ing the name of Ceylon. It is to be hoped, too, that erelong there will be some proper accredited supervision at your Customs. It is the only sure safeguard. Possibly the Regulations here may be over-stringent, but not without cause.

When the tariff was being debated the strongest argument used for the retention of some duty on tea was not so much the need of it for revenue, but that

FREE SYDNEY

had become a by-word as the dumping ground for all that was most abominable and dirty in the tea trade, the refuse being used for blending. It was argued that the 3d duty made such imports financially prohibitve here ; but predicted that the moment Melbourne became a free port it, too, would be flooded with the filth for blending. Today the Protectionist prophets are simply saying "I told you so." Fortunately for the consumer, the Board of Health has stepped in strongly.

Some of the Firms, which have just happened to be dropped on, are well-known Houses considered beyond reproach, who must make the best stand they can against the Government. As one, in special, comes in direct contact with the public, I shall be able to let you know details and how matters go in a week or two.

I was told yesterday that there are a lot of "Ceylons" among the condemned tea ! "*Ceylon dusts*, I suppose, you mean" I replied, which, no doubt, it is; but—quoted by the man interested in "Chinas or Indians" depend upon it—it is simply "Ceylons." In the meantime it is hard on the patient planter doubling his Cess, and striving with tooth and nail to get his product back to something of its good old footing, to have the reputation of his teas' purity sullied by unscrupulous exporters. In fact, I think, it is shocking that he is not protected against such happenings. It is this sort of thing which disheartens and disgusts those who are doing their best to push Ceylon Tea and watching with anxiety for a return of prosperity to the planters of

LANKA.

TEA IN MELBOURNE.

SAMPLES OF CUSTOMS ANALYSES.

A Colombo merchant has favoured us with the following :—

(*Copy.*)

Custom House, Melbourne, 18-12-01.

To the Government Analyst, Melbourne.

Sir,—I beg to hand you the accompanying sample of Tea marked as per margin, with the request that you will analyse the same and furnish a reply to the following questions, viz :—

1. Is the sample really Tea ? Yes.
2. Is it exhausted Tea within the meaning of Act No. 6 of 191 or mixed with other substances or with exhausted Tea ? Yes, the total ash exceeds 8 per cent,
3. Is it fit for human food ? According to Customs Act 1901 Reg. Sec. 54 it is unfit for human use.—I have the honor to be, Sir, your obedient servant,

(Signed) R. H. Dawson, *pro* Collector of Customs.

(*Copy*)

Commonwealth of Australia, Customs and Excise Office, Melbourne, 31—5—1902.

To the Government Analyst, Melbourne.—I beg to hand you the accompanying sample of tea marked as per margin, with the request that you well analyse the same and furnish replies to the following questions, viz :—

1. Is the sample wholly Tea ? It is tea dust.
2. Is it exhausted Tea ? No.
3. Is it adulterated with spurious leaf or with exhausted leaves ? No.
4. Is it unfit for human use ? According to Regulations 15, Section 54, it is.
5. Is it unwholesome ? No.
6. Does the sample comply with Regulation 15 relating to Sub-section (*e*) of Section 54 of the Act ? No.
7. Give result of analysis.—Total Aqueous Tea extract, 42·1 per cent. ; Total Ash, 8·79 ; Soluble Ash, 3·79.
8. Is the tea in your opinion a "prohibited import" within the meaning of the Customs Act and Regulations ? It does not comply with the regulations under the Customs Act, *i.e.*, it contains more than 8 per cent. of Ash.

(Signed), C. R. Blackett, Government Analyst.

AFRICAN OIL PALMS.

We are surprised to learn that nothing is being done with the fruits of the West African Palms planted at Udagama a good many years back. One report on the palms is:—"They are still growing, they have attained to considerable size, but I do not think the nuts are of any value. The nut is smaller than a walnut, covered with a very tenacious fibrous husk like an areca. It seems to me to be of no value."

This surprises us very much ; has any attempt been made to crush the nuts and extract the oil ? Let a native chekku-mill be used, and the result reported.

PLANTING NOTES.

Cohune Palm Nuts.—In British Honduras the Cohune Palm grows over a large extent of territory without any care or attention, and it having been ascertained that the kernel yields a supply of first-class oil, it has been determined to place the nut on the market, provided a machine can be invented by means of which to crack the nut and so to secure the kernel uninjured and ready for the oil extractor. The Agricultural Society of Belize has the matter in hand, and a barrel of Cohune nuts is now on the way to Mr Currie of the Imperial Institute, and he, we believe, will see to the placing of the sample before the trade. Mr Currie, we are informed, has reported that the value of the nuts is about £17 per ton.—*Gardeners' Chronicle*, Aug. 23.

"Castilloa Elastica Rubber Dried in the Sun.—Senor Joaquin Jimenez, an extensive sugar and coffee planter of Tuxtepec (Oaxaca), Mexico, is interested also in the cultivation of his India-Rubber, having planted up to date some 10,000 trees, though, perhaps, this number is not now standing. Recently he permitted some of six and eight year old trees to be tapped by men sent to his place by a Vera Cruz trader, who extracted and cured about 700 pounds of rubber for which they paid 80 cents, Mexican. The trees tapped yielded an average of about one pound per tree. There are on the plantation half a dozen trees, planted fifteen or sixteen years ago, one of which is supposed to have yielded 11 pounds of rubber this season. The rubber here referred to was prepared without the addition of any coagulating agent, the *latex* having been poured over a coffee *patio* (drying floor) and dried in the sun.—*India Rubber World*, August 1.

COFFEE AND RUBBER.

A writer of Planting notes in the *Madras Mail* Sept. 15th says;—Advices from London as regards the state of the coffee market are meagre in the extreme. While stocks of course still remain high, deliveries in London are very much less than at the same time during the last few years. Meanwhile, the price for rubber is rising steadily and there is little doubt that there will be a great and increasing market for it for many years to come. The uses for rubber have increased so greatly in the last few years,—and the industries for which rubber is so indispensable are all those with great futures before them—that there is every probability that the demand will ere long exceed the supply. Rubber of one kind or another—and the name of rubber-yielding plants is legion—will thrive almost anywhere in the tropics. But, it may be alleged, the areas of indigenous rubber forests now in full bearing are so vast as to make one doubt if the supply from them could ever fail. There is certainly no denying that there are prodigious forests of these trees; but at the same time one must bear in mind that the methods of extraction in many of these places are most crude and destructive, and the methods employed leave the jungle a useless and barren waste. This reckless destruction is bound to tell before long, with the world's consumption increasing as rapidly as at present. On the other hand, there is a talk of artificial rubbers, not of one but of many, and with the example of the indigo planters before them coffee planters may well hesitate before running their heads into a similar noose. I have been led to make these remarks on rubber in connection with coffee owing to something I read in the Report for 1901 of the United Planters' Association of the Federated Malay States. This says that a good deal of coffee was planted in 1901 mostly *in conjunction with* Para rubber, and that the cultivation of it (the coffee) has been well maintained and the quality improved. This will be news indeed to planters in Southern India, both on the score that rubber growing among coffee does it no harm,—Para rubber, that is to say, for Gutta Rembong (*Ficus elastica*) is acknowledged to be prejudicial to coffee,—and secondly, that it even improves the quality of the coffee produced. Nor does this seem unreasonable when one considers how very much planters depend for their shade on the *ficus* species—the *atti* or *ficus glomerata* being the most favoured of all,—and that trees of the *ficus* tribe all produce milk from which rubber of a sort may be made. The *Hevea Braziliensis* or Para rubber is expected to yield in four to five years about 6oz. of dry rubber per tree, and some six year old trees have yielded over 1lb. at their first tapping. This is in the Federated Malay States of Perak, Selangor and Negri Sembilan. And Para rubber is selling at Home now at 3s 4d per lb. From two 19 year old trees of *Ficus elastica* in Perak I learn that 25lb of rubber was extracted per tree in one year.

THE MADRAS GOVERNMENT CINCHONA PLANTATIONS.

The Report of the Administration of the Government Cinchona Department, together with the Government Order thereon, have just been published. Mr George Romilly, the officiating Director, in issuing the Report, recalls to mind that he only took over charge of the Department five days before the end of the official year 1901-02, and that he was consequently in charge for that time only of the year under review. However, the Report has been prepared on the lines hitherto adopted and, in the words of the Government Order, is clear and concise. The year seems to have a successful and fortunate one in every way. Not only was the season favourable on all the estates—the rainfall being ample and well-distributed—but the quantity of quinine distributed was the largest on record, *viz.*, 11,978¼ lb. The installation of new machinery was the feature of the year. By means of it the bark is dealt with by the shale oil process instead of with the fusel oil in use before. But it was soon found that the machinery was in some respects defective and the results unsatisfactory. It was not till steam coils had been inserted in the extractors for the purpose of heating the shale oil that the full return of alkaloids was obtained. The machinery itself was not in full working order until November, but from then till the end of the year work progressed steadily and satisfactorily. The bark worked up was, however, of an inferior quality, so that, as the Government Order says:—"In the circumstances, the year's work cannot either in point of quantity or of cost be taken as a criterion of the efficiency of the factory." The total area under cultivation is 1,071½ acres, of which 831½ acres are old, the remainder being composed of three extensions. The expenditure on the upkeep of the total acreage, including the charges of the head office, works out at R47-10 per acre. The total expenditure was R1,30,051. Of plantations was R58,938-13-1, and the expenditure in the purchase of bark and on manufacturing and distributing charges was R71,102-9. Excepting on one estate—Hooker—where the trees died out in considerable numbers, the plantations thrived in the year under review. The year's crop amounted to 154,044 lb, of crown and hybrid bark, but the annual yield required from the existing plantations has been fixed for the present at 3,000 lb. of manufactured quinine, and this amount is represented by 85,750 lb. of bark of 3½ per cent. quality. This has led Government to state in its Order that it would be glad to have the Director's assurance that the plantations have not been overworked, and it draws attention to the importance of maintaining the plantations as a reserve against the contingency of the market price rising. Some important scientific experiments were made on the Doddabetta estate during the past year. Samples of bark were taken from 38 trees selected at random, but large and well-grown ones, and their bark was analysed. The results in some cases were extraordinary, some samples giving as much as 13·90 per cent. of sulphate of quinine—a percentage which is probably unequalled by *Cinchona officinalis* anywhere. At present rates the value of an acre of trees giving bark containing 10 per cent sulphate of quinine, would be approximately R18,750. Further experiments are to be continued in the coming year, and seed from these good-caste trees will be carefully selected, sown and their produce tested. If the descendants of the parent trees prove equally rich in quinine, and fields can be grown giving an average of this 10 per cent bark, the poorer barks can be gradually eliminated and neglected. The extreme richness of certain of these samples augurs well for the success on the Nilgiris of the system of propaga-

tion by seed from trees selected on the analysis on their bark. The quantity of quinine distributed was the largest on record, a considerable increase having taken place in the sale of pice packets through the Post Office, which system was extended to Mysore Province. Over 9,500 of these packets (each packet contains 102 five grain powders) were sold this year as compared with 8,792 sold in the previous year. The balance sheet shows a loss of R7,293-10 3, a fact which is due to the prices charged and realised during the year not being sufficient to cover working expenses. In the future, either the price must be raised or the cost of production must be materially reduced. In conclusion, the Government in its Order tenders its thanks to the staff, one and all, but to Mr Standen in particular, "for the attentive care and ready resource that finally assured the success of new machinery."—*M. Mail*, Sept. 16.

CEYLON SPICES IN THE LONDON MARKET.

The following extract from the "London Commercial Record" is worth reading, in connection with the remarks of a merchant which we append to it:—

"Dealers in Spices may congratulate themselves as being about the only people who could boast this week of something like activity and good business. Not only have Pepper and Ginger maintained their rising attitude, but Cinnamon owing to the holding of the Quarterly Sales, has craved their attention as well. These Cinnamon sales have long ceased to be of any great importance, the days when they caused a stir in the market are over, yet they form an interesting function and not altogether devoid of importance to a fairly large proportion of Spice dealers and brokers. Cinnamon, like many other articles, has ceased to look upon London as the distributing centre of the world. It finds its way from Ceylon direct to any place of consumption, be it ever so small and be the quantity ever so insignificant. Germany, which used to procure its requirements from London, is now importing direct, and may be looked upon as the principal buyer of the spice; U. K. comes next, while Spain and America are steadily increasing their imports. To look at the steadily decreasing stocks in London, and the ever diminishing quantities exposed for sale, one is tempted to believe that a substitute for the product had been found, and that it is gradually dying out of consumption. This is, however, far from being the case. As a matter of fact the consumption, at any rate of quills, has steadily increased, as is clearly demonstrated by the following figures:—

1899	...	2,515,091 lb. quills.
1900	...	2,678,111 ,,
1901	...	2,756,270 ,,
		and
1899	...	1,829,127 lb. chips.
1900	...	1,863,406 ,,
1901	...	1,516,033 ,,

America seems to cultivate an increasing taste for this delicious spice, for no less than 358,300 lb. were exported to that country during 1901, as against 259,425 lb. in the previous year. The greater part goes on to San Francisco, whence it is distributed over Central America. In spite of the apparent increasing demand prices have steadily declined, and we doubt very much whether anybody has appreciably benefited by his operations in Cinnamon. We heard usual assortment had been sold recently at 8½d c.i.f., a price, to judge from the values ruling in Ceylon, clearly proving the anticipation of still lower figures. The same opinion as to the future seems to be ruling in our market as well, for we doubt if an offer even at 8d c i.f. would find a buyer. The auctions passed off with a fair demand; of the 825 bales exposed for sale, 517 changed hands, but prices could not be maintained and holders had to agree to a decline of from ½d to 3d per lb. according to quality. Since the auctions extreme quietness has ruled supreme, and even Colombo has not thought it advisable to try our market with an offer of any sort. Now the sales are over. Dealers in spices can bestow their entire attention upon the more remunerative branch of the trade once more."

On this a local correspondent remarks:—

"In place of the value of Cinnamon having gone down in Ceylon since the last quarterly sales in London, prices of usual assortment have improved quite ¼d to ½d per lb. So much for the influence of the London sales on the Colombo Cinnamon Market. How have the mighty fallen!

"Some day it will be the same with Tea if the enormous dock charges in London are not reduced."

DUTY ON TEA IN RUSSIA.

The following letter from Mr Renton to the Chairman of the P. A. has been placed at our disposal:—

Berlin, August 28th, 1902.

DEAR MR. KINGSFORD,—The Moscow papers of August 8th old time and 19th new time quote from the "Official Messenger" an Imperial decree raising the Customs duty on black *flowery* (?) green and *yellow* (?) teas imported into Russia *via* the Sonirechensk, Steppe, Irkutsk and Amour general governorships from roubles 22·50 to 25·50 per pound. The Customs Authorities are to be informed by telegraph of the immediate enforcement of the above. The decree states the above increase is temporary pending consideration of this question by the State Council. It is due, continues the decree, to the considerable decrease of expenses incurred in the delivery into Russia of Chinese tea, thanks to the Manchurian and Siberian Railways, thus necessitating more conformity between cost of sea and overland freight. The section of the Tariff affected is section 20, para 2. This increase ought to help Ceylon teas all the more, I think.—Yours sincerely, (Signed) J. H. RENTON

A. C. Kingsford, Esq., Rookwood.

A NEW VARIETY OF PEPPER.—Pepper, being a comparatively high-priced commodity owing to the fact that it grows only in a few countries. is subject to much adulteration. For this reason a report recently made by Professor Moissan, of Paris, is of importance. This report states that a new variety of pepper has lately been imported from Kissi, in French West Africa, on the borders of Liberia, which has been called *Piper Femichoni*, Heckel, after two investigators, one an army surgeon, the other a botanist. Dr. Barillé, principal chemist to one of the Paris hospitals, has examined the seeds and found that they yield a highly aromatic reddish-brown powder, rich in essential oil, and with peculiar characteristics He considers this variety of pepper an acquisition among the useful plants.—*Chemist and Druggist*, August 30.

COFFEE—CACAO—RUBBER, &c.

In an article from the pen of M. Paul Dreyfus in "L'Economiste Francais", the future of the African Republic of Liberia is dealt with in an interesting manner. Of late years more and more attention has been directed to West Africa and to the commercial and industrial possibilities of Liberia. This Republic is governed by natives repatriated for the most part from the United States, and its legislation as well as the character of its inhabitants is somewhat antagonistic to Europeans and European trade; but it will in the near future be impossible for Liberia to avoid close contact with foreign capital and foreign manufactures, in view of the many European establishments already scattered throughout the neighbouring regions.

Information as to the economic condition of Liberia is by no means easy to obtain, inasmuch as no official statistics exist. A sort of quarterly return of trade with interior is drawn up by the Liberian Customs and transmitted to the Treasury, but the latter department does not communicate these documents to the representatives of foreign Powers. The ports open to foreigners are Cape Mount (Robertsport), Monrovia, Junk River (Marshall), Grand Bassa Buchanand), Edina Rive, (Grand Sestos), Sinoe (Greuville), Setta Kroor Harper, and Cavally. No foreigner is allowed to become resident in the interior of the country, but there is a "reform party" in the Liberian Congress, and it is believed that considerable modifications in the present legislation as to foreigners will shortly be proposed. There is no staple industry in Liberia, and agriculture is in a very primitive stage. There are, however, great possibilities for agriculture, if the legislation admitted the employment of foreign capital in the country. Water is everywhere found in abundance in the Republic, and nearly all tropical products can be cultivated most advantageously. Liberian coffee is excellent, having a much appreciated flavour which cannot be found elsewhere. The present price of coffee in bulk is 9d to 10d per English lb. The coffee plant grows in a wild state in the forest lands between the Mamal River and Cape Palmas, and in the interior as far as the Mandique plateau. The coffee plant commences to produce in the fourth year of its growth, but it would be necessary to improve the present method of decoration or barking, which does not present the berry in a very advantageons manner. Ginger, too, grows well, and palm trees are extremely abundant, especially in the Cape Palmas district (hence the name). Cotton also grows easily, but its culture is neglected. Arrowroot is also a product which can be grown with profit in Liberia. Cocoa is grown, but only to a small extent. Maize, pepper, rice, millet, yams, tapioca, orange trees, lemons, bananas, and guava, grow abundantly. The forests contain plenty of mahogany, yellow wood, gum trees and camwood. There are numerous India-rubber trees, but the Liberian Rubber Syndicate has obtained a monopoly of the rubber concessions in Liberia.

It is believed that there are rich gold veins in the Republic and also extensive coalfields, but so far none of these have been prospected. England exports to the country tissues, salts, soap, beer, salt beef, rice, whisky, condensed milk, potted meats, galvanised iron, tin, made up articles, vinegar, biscuits, &c. Germany does a good trade in wearing apparel, ironmongery, tools, petroleum, hats, both straw and felt, food stuffs and galvanised iron. France does very little, her commerce with Liberia being limited to a few liquids and tinned foodstuffs via Liverpool. Monrovia, the Capital, is also the business centre. It contains about 5,000 inhabitants, and is in frequent communication with Liverpool, Antwerp, Hamburg, Rotterdam and Marseilles. The population of Liberia has been estimated at various figures between 2,000,000 and 767,000. In 1894, the last year for which figures are available the expenditure was $151,975 and the revenue $158,861. The public debt in 1897 was £100,000 contracted on a 7 per cent loan in 1871. There were in that year £164,000 arrears or interest. In 1898 an arrangement was made for the settlement of the debt as follows: The interest to be reduced to 3 per cent for three years, rising ½ per cent every three years to an maximum of 5 per cent. A sinking fund of 1 per cent will commence to operate in October 1904. The interest has been regularly paid since the arrangement. There is no army, but two brigades of militia, which may be called up in time of war. There is no longer any navy.

Such is the somewhat vague information Europeans possess about Liberia, but it is to be hoped that the measures now submitted to the Senate and the Chamber will open up this apparently naturally rich country to foreign enterprise.—*Financial Times.*

HOW TO MAKE BARREN TREES FRUIT.

AN OPINION FROM AMERICA.

We receive many enquiries as to how to make barren fruit trees bear fruit. We have invariably recommended root-pruning and occasionally "ringing." The late Professor Goff of the University of Wisconsin, U S A, one of the highest authorities on fruit culture, and who made a special study of the root system of fruit trees, propounded the theory of renewal pruning or invigoration of fruit trees through the medium of what are called "water sprouts." These "water sprout" shoots are produced in the old age of the trees for the purpose of replacing the old and reproductive wood and thus extending the age and usefulness of the trees. They are due to extended root action and when they appear in young trees, should be removed at once, as they produce wood without fruit. Root-pruning will prevent this, and induce the trees to fruit.—*Madras Mail*, Oct. 9.

THE OIL WELLS OF TRINIDAD.

The current issue of the *Board of Trade Journal* calls attention to the exploitation of the oil-wells of the Island of Trinidad. No great quantity has yet been brought to the surface, although expert opinion indicates a very large supply. Analytical reports, however, are highly favourable regarding the quality of the oil. The discovery is said to have great commercial importance in view of the approaching cutting of an Isthmian Canal, and the proximity of Trinidad to what will in consequence be a great trade route.—*Daily Chronicle*, Aug. 15.

RUBBER PREPARATION.—Says the Editor of the *India-Rubber and Gutta Percha Trades' Journal*, Sept. 1st:—a method of preparation on a par with scientific cultivation is eagerly desired. We take this occasion again of pointing out how emphatically useful will be the reseraches of Dr Weber who is at present investigating this very subject, not in the laboratory but on the spot in Para,

A NEW VARIETY OF PEPPER.

Pepper, being a comparatively high priced commodity owing to the fact that it grows only in a few countries, is subject to much adulteration. For this reason a report recently made by Professor Moissan, of Paris, is of importance. This report states that a new variety of pepper has lately been imported from Kissi, in French West Africa, on the borders of Liberia, which has been called *Piper Famechoni*, heckel, after two investigators, one an Army Surgeon, the other a botanist. Dr. Barille, principal chemist to one of the Paris hospitals, has examined the seeds and found that they yield a highly aromatic reddish-brown powder, rich in essential oil, and with very peculiar characteristics. He considers this variety of pepper an acquisition among the usual plants.—*M. Mail*, Sept. 17.

JAVA QUININE.

The report on the Government cinchona plantations in Java during the first quarter of 1902, has been just issued. In the nurseries there was a large stock of well-developed plants, of which several thousands were sold to private planters. Contrary to what had been the ca e in previous years, very little bark had been shipped at the end of the quarter, owing to lack of labour. This scarcity of labour is a very grave question, and if the conditions do not improve within a short time it may have a serious effect on the harvesting and the preparation of the soil, which again will injuriously react upon the crops of the next few years. Analyses made with hybrid-grafts during the quarter under review confirm previous observations, that the increase of the alkaloids content is greater in the second year's growth. The analyses showed a content of sulphate of quinine in the first year of 2·74 and 2·60 per cent; second year, 6 and 5·60 per cent; and third year, 7·73 and 8 04 per cent. A large number of grafts were taken during the quarter from *Cinchona robusta*. These could be removed from the nursery and planted in less than three months' time. Ledgeriana and hybrid grafts, on the other hand, require from four to five months. The total number of plants at the Government plantations at end of the quarter was as follows: in the nurseries, 1,245 Ledgeriana, 300,700 Succirubra, and 30,000 hybrid in the open ground, 1,943,500 Ledgeriana, 402,900 hybrid, 343,800 Succirubra, and 45,000 officinalis.—*Planting Opinion*, Sept. 13.

RUBBER ACCORDING TO THE CONSULS.

SENEGAL.—Exports of rubber during the years 1900-1 were as follows :—

Countries exported to	1900. Quantity tons.	1900. Value. £	1901. Quantity tons.	1901. Value. £
France	380	74,621	318	38,748
U. Kingdom	32	6,476	..	8
Germany	21	..	38	5,509
Belgium	..	4,365	...	...
Other countries	...	...	..	50

LIBERIA.—As regards rubber, the Liberian Rubber Syndicate have the whole of its export from the Republic. They pay at present (1902) 1s 1½d cash per lb. in the country. The export duty is 3d per lb.

FRENCH-GUINEA.—Having been a rubber-country for many years, the vines, owing to wasteful producing methods of tapping them, had become comparatively scarce, and in order to increase the quantity of rubber for sale, the natives adulterated it in various ways. The merchants anxious to profit by the high market accepted the bales without examination, with the result that the rubber bought from the natives during the season 1899-1900 contained as much as 25 per cent of impurities. The home markets, who could obtain rubber of a much higher quality from other sources, refused to buy the Guinea rubber which thus remained on the hands of the merchants, who, in many cases, were compelled to sell at a loss. The Government has adopted several measures which, it hopes, will remedy this state of affairs.—So as to improve the quality of Guinea rubber, a Decree was issued in May 1900, forbidding the sale of rubber in unopened bales. This has already had a good effect as the natives finding they were certain of detection ceased adding foreign matter, but as the method of coagulating the rubber in calabashes ordinarily employed by the natives made it difficult to detect adulteration with resins, a further Decree was issued to the effect that, dating from the wet season of 1901, the only rubber allowed to be exported would be that prepared by the Foulah method, in red filaments which was found to be the only one which permitted the detection of resinous adulteration.

Exports and destination of rubber in 1899 was as follows :—To France and Colonies £15 943, United Kingdom and Sierra Leone £213,746, Germany £43,622, other countries £6,432, total £279,743. In 1900 it was to France and Colonies £31,521, United Kingdom and Sierra Leone £137,641, Germany £67,384, other countries £16,319, total £252,865.

GUATEMALA.—In 1900 there was india-rubber to the value of £53,012 exported while last year the value only reached £49,510. The coast-lying districts are particularly well suited to this industry, and with a little perseverance and patience planters would reap year by year, more and better crops, and would become independent of the varying prices of the coffee market. The Consul adds :—The cultivation of the rubber tree and the export of the product is a growth entirely of the last few years, and it is undoubtedly an industry which is admirably suited to the coast districts of the Republic, and should more than make up for the apparently permanent falling-off in the coffee-growing industry. Coffee, it has now been found may be grown with ease in all countries where a certain temperature prevails, and the consumption does not increase in proportion to the supply; while on the other hand good rubber is as yet only obtainable in few parts of the world, and the demand increased every day, and this demand seems likely to go on increasing with every new invention and improvement in almost every branch of the manufacturing industries. It is, therefore, worth the while of those who are considering the advisability of a planter's life in tropical countries to enquire into the details of rubber planting, at any rate so far Central America is concerned, where concessions of land are easily obtainable at very cheap rates, and where the huge markets of the United States lie so close at hand. It must be remembered, of course, that the returns are considerably longer in coming in than in many crops for rubber takes 10 years to yield a full crop. A person thoroughly acquainted with these subjects recently explained to me that the method he would follow would be to plant a grove of, say 100,000 plants, which at the end of five years would yield certain crop, say one-third of what fully matured trees should yield. At the end of the fifth year, the plants should be thinned down to half their number, or 50,000, on these 50,000 trees of five year's old a handsome sum would be realised which would entirely repay the original outlay, the running expenses being paid by the cultivation of some such fruit as the banana thus leaving the planter at the end of five years with all his outlay paid, and a grove in his possession yielding a larger product every year, and the expenses of his plantation paid by the secondary crop of bananas.—*India Rubber Trades' Journal*, Aug. 18.

WASTE PRODUCTS :

ARE COIR DUST AND COCONUT 'WATER' USELESS ?

The extent to which waste products regarded as useless a few years ago, are now utilised in a variety of ways, in each succeeding branch of industry, is nothing short of marvellous; and we are hopeful that every year will add to our knowledge of the latent possibilities of much that is even still being thrown away. Now that the Messrs. Böhringer are in the market for tea refuse, no part of the outturn of upcountry Factories need be thrown away—or, what is even worse, sold to a class of people who will bring it into competition with what is avowedly sold for human consumption, and of which, alas ! the markets seem to have too much. But, it is in respect of the products of the Coconut Palm, notwithstanding their proverbial thousand uses, that there seems to be special room for the work of the inventive genius ; and, with a staff of skilled scientific workers connected with the Botanic Gardens—the Agricultural Department of the Government—it should not be left to outsiders to show what can be done with our " waste products." Analysis, for instance, has shown that the husk of the coconut is rich in potash ; and yet coir dust, the residue after the removal of the fibre of commerce from the husk, is regarded as useless, save as an absorbent or deodorizer, and is allowed to rise mountains high in the vicinity of Coir Mills where the dust occupies valuable space and must be a menace to public health. Is it of no manurial value ? And can it not be made of value as a manure by the action of fire, or of chemicals? Our German cousins are, perhaps, ahead of any other nation in turning to practical use, their knowledge of chemistry ; and, if all we read be true, they have sounded the death-knell of the indigo industry on the adjoining continent. As manure manufacturers they may be able to point the way in the direction we have indicated ; but meanwhile we hear of an interesting experiment for the conversion of coir dust into fuel in the form of bricks by pressure. A two-fold possibility unfolds itself to our vision. Not only may the resulting ashes prove highly efficacious as a manure; but there is also the chance that high pressure may disclose more profitable uses than fuel for the brick, and lead to the adoption of the hardened block or building and manufacturing purposes ?

Another waste product is the water of ripe coconuts which are split every year in Ceylon to the total of hundreds of millions for domestic use, for copra drying, and for desiccating purposes. The water of the young coconut is a delicious and refreshing drink. When the nut is ripe, the water is sharper in taste and smacks of toddy. Is it absolutely useless for the distillation of spirits, for the manufacture of sugar and jaggery, and even as a manure? Analysis shows that it contains 1·64 per cent of sugar ·26 gum, ·06 phosphate of lime, ·10 chloruret of sodium, ·33 acetate of lime and of potash ·08 pectic acid, ·16 albumine. Are the constituents too small to be of any practical value, considering that the water might well be collected in hundreds of gallons every day? Not very long ago the ashes from Woolwich arsenal were used simply to fill up hollows ; an observant neighbour was regarded as a public benefactor when he offered to take all the stuff at 3s 4d per ton. A policeman or a watcher, more alert than most Government servants, observed copper filings being removed from the heaps. He confided the secret to his superior officers who thought they might try the experiment of selling the refuse by auction or by tender. The result was £6 a ton ! A big leap from 3s 4d and yielding £10,000 a year. It is estimated that official shortsightedness is responsible for the loss of quite a quarter million sterling at Woolwich through ashes alone. Returning to our own island, we are ready to forget and forgive past losses if only we are let into the secret of making a profitable use of Coir Dust and Coconut Water !

ORANGE CULTIVATION IN EGYPT.

There is no donbt but that the cultivation of oranges is a far too neglected branch of horticulture in Egypt, which has been especially recommended by experts as one of the best suited spots for the establishment of a garden for oranges and other fruits of its class. Although much progress has recently been made in its cultivation in this country, there is still room for much greater extension. At present the export of oranges only amounts to about one eleventh of the import, and, fortunately for those in the orange trade, the fruit comes in at the same time of the year as the annual influx of visitors, much to their mutual satisfaction. The "Yussuf Effendi" is the variety most extensively grown here. These are mostly sold locally or at neighbouring large towns at a fair price. Although a nicely flavoured and satisfactory fruit. it has been cultivated too exclusively. The small variety, sold in England as Tangeriness, fetch about the same price as the best Jaffas. They should prove very remunerative to growers here for export. Belonging to the same loose-skinned group are the "Nagpore" of Bombay and "Sylhet" of Calcutta. Both of these are grown very largely in India and are very much alike. The "Nagpore" tree is a spreading variety while the "Sylhet" is an upright tree, grows higher, and is only grown from seed. Both are excellent varieties for exportation. Two other varieties which should do well here are the "Santolah" and the "Keonla." The former orange is very small but extremely sweet. It grows almost wild in the hot, humid part of India between the Himalayas and the Ganges. It should be suitable for those parts of Egypt or the Sudan which have a similar climate ; but should, of course, be tried in any part which can be kept well supplied with water throughout the year. Naturally, it requires very little attention. As novelties are always acceptable in English markets, and as it is sweet almost before it is quite yellow, it promises well. The "Keonla," another Indian orange, is to be greatly recommended on account of its lateness. On comparing one of these trees with the "Yussuf Effendi" one would imagine that as both oranges were of the same hue and size they would both be ripe. This, however, is not so. Long after the other oranges have been gathered the "Keonla" stays on the tree until at last its colour is a beautiful dark red, and not till then is it sweet. Of course, in Egypt, this should be ready for gathering just as the "Yussuf Effendi" is over and when the "Portugal" is dearest, at about the end of April. Many other varieties of the Santara

group, grown in India, Ceylon, South China, the East Indies, and Australasia, might be tried. The Australians have for two or three years been sending oranges to England. They are mostly of the Portugal variety and have reddish skins. This is, of course, rather an attraction, and so they sell at about two or three times the prices of the ordinary ones. Considering that it takes three times as long for ships to reach England from Australia than from Egypt, this should greatly encourage growers here.

Belonging to the Portugal group there are many kinds which ought to be grown here with great success. Already Egypt has successfully reproduced the blood orange from seed—a feat apparently as yet unaccomplished in any other country. Other varieties have been grown well in private gardens. There should, therefore, be a great extension in the growth of the seedless, egg-shaped orange of Malta, the Jaffa seedless varieties, and the "Bisry," which is grown from seed, and is one of the best of Jaffa oranges. All of these are too well-known to need description. The great advantage of this class of orange is its keeping qualities. With careful packing it will keep for two or even three months. The British Chamber of Commerce in Egypt reports that the egg orange has been introduced into Florida, and has been so successfully cultivated that it is probably now more extensively planted there than any other kind. In Malta there is said to be also a unique orange of the same group which is never sour from beginning to end but sweet and juicy. It is there called "Loomi Larenj." Such an orange should be well worth cultivating and should always command a good price. Another orange sold in Bombay, the "Mussembi," is brought from Poona, and it is said that it can be kept on the trees for a whole year without deteriorating. The Chamber of Commerce rightly complain that the "Leimoun Hindi," often exhibited at our horticultural shows, is not properly cultivated. To obtain a really delicious fruit the trees must have, as nearly as possible, conditions of soil, heat, and humidity similar to what they have in the island of Labuan and at Amoy where they grow to perfection.

As regards the treatment of the orange tree, practical experience combined with logical reasoning is of far more value than theoretical book information. Nevertheless, it is both interesting and very useful to read of results of others' experiments and work, and to profit by their successes and failures. The number of trees per feddan should be, to obtain the best results, one hundred. At Jaffa, however, as many as six hundred per feddan are generally to be found. Abundance of irrigation water is the *sine qua non* of a plantation and the watering should be done continually. The fruit consisting of over 90 per cent water, it will be understood that without a sufficient supply the tree cannot possibly do well. The average of several analyses of the orange shews that there are four parts each of nitrogen, phosphoric acid and potash per thousand. Calculating from this, 1,000 kilos of oranges will contain 4 kilos of each of these three constituents. Growers generally fail to supply this amount again to the soil, and, consequently, it gets weaker and the produce of oranges less. To obtain theoretically this amount of each, the trees supplying the thousand kilos of fruit should receive 2½, 2½ and ⅞ kilos respectively of nitrate soda, superphosphate of lime, and sulphate of potash in return, besides an additional quantity for their growth of wood and leaves. Manure is one of the absolute necessities of the orange tree if it is to produce well. Every piastre properly expended in well manuring the trees brings much over a piastre's worth of extra fruit, either numerically or in size, besides giving a better flavour to it. The soil of Egypt is admirably suited to the physical requirements of the orange tree. A perfect soil is a mixture of sand and a little clay and lime. The lightness of this soil allows the water to sink in easily and the roots to spread out well. Now, if there be added to this good food for the tree, it can, of course, do well. The nile mud, like the "loess" of China, is a typical fertiliser. But growers must remember that where the deposit is thin or absent cultivation cannot be carried on profitably without, abundance of artificial manures. Speaking in a simple way, nitrogen produces wood and leaves phosphates produce fecundity, and potash produces sweetness and flavour. Lime is absolutely necessary for the orange tree, which absorbs great quantities of it. If not present in the soil it should be supplied in the form of Gypsum. If too abundant the sap will not run freely but ½ kilo of sulphate of iron for each thousand kilos of fruit produced will correct it. The Gypsum and iron sulphate also help to fix the fruit on the tree. Seeds should not be treated with mineral fertilisers but should be given plenty of organic food. Stable refuse is excellent for the seed beds, but it should be passed through a very course sieve and the big straws taken away. Most people in Egypt make the mistake of digging holes round their trees and filling these with water. Instead of a hole, in the middle of which stands the tree, a ring should be made so that neither fertiliser nor water will touch the trunk. One very successful orchard owner bores holes in the ground in a circle round the tree varying in the size, depth and distance from the stem according to the size of trees. These he frequently fills with liquid fertiliser so that the roots thus receive a greater benefit and the tree can better keep its upright position. The best time to apply the manures is about a month after the gathering of the crop and again when the fruit is about half-grown. Thus the first part will strengthen the tree for producing the fruit and the other part will supply the nourishment for the fruit when growing.

Lemons, limes, citrons, and other trees of the Citrus group require almost the same treatment. The lemon and citron need more nitrogenous manures than the orange to the extent of about 12 per cent. and the other sour fruits of about 10 per cent Lemons in this country are smaller but more juicy than others, and limes are very inferior. Both would repay generously more liberal feeding. A few only of the best and most suitable kinds of oranges have been named. There are many others which might be grown to advantage. Young trees and picked seeds can generally be obtained from the nurserymen and horticulturists in the different countries. Those who are anxious to obtain them would, no doubt, be able to get information and help from their respective Consuls. It is to be hoped that orange-growers will take "Excelsior" as their motto, and that we shall soon see a great development in the orange trade. With a little experimenting and care, many new varieties should be well-established and both quality and quantity improved. Those who prefer to keep to their present variety should at any rate spend a little on improving it. One thing is certain, any expenditure the growers may make in doing either or both will prove a good investment.—*Egyptian Gazette*, September 2.

THE DIFFICULTIES OF SELANGOR COCONUT PLANTERS.

Mr. Tanner, of the Kempsey Estate, Kuala Selangor, has again been visited by elephants. They damaged over six acres of young coconut trees. Two Malays followed the herd and state that they wounded some of them. This is the third time that Mr. Tanner's Estate has been similarly patronised.

It is reported that the Inspectorship of Coconut Trees is to be a Federal appointment. Mr Grieve, of Kapar, is making a collection of the various kinds of coconut beetles, which he will ultimately hand over to the officials.

There is a report that there is a particularly bad bit of coconut-beetle infested ground immediately adjoining a Malay school in the neighbourhood of Kuala Selangor.—*Straits Times*, Sept. 12.

PLANTING NOTES.

OLD TREE STUMPS.—To remove old stumps, a correspondent to the *Country Gentleman* gives the following:—'Get a 2 inch iron pipe, 8 ft. long; have a steel point welded into one end of it. With a sledge hammer drive this under the stump as far as may be necessary. Drop half a stick of dynamite into the hole thus made, and tramp earth upon it until the hole is filled, then light the fuse. The stump will be lifted entirely out of the ground with no earth adhering to it, so that it may be burned the next day.'—*Agricultural News.*

INCREASED EXPORT OF RAMIE FIBRE FROM KIUKIANG.—In his recent report on the trade of Kiukiang for the year 1901, the Acting British Consul at that port states that there was a marked rise in the export of ramie fibre, from 95,689 cwts., valued at 87,596*l.* in 1900 to 116,294 cwts., valued at 114,164*l.* in 1901. This is explained by the success of the experimental shipments to Germany having led to a continuance of such shipments by German firms in Shanghai. The average price was also higher than in 1900, and the Consul is informed that the advance has continued, so that this fibre, which is produced in the neighbouring part of Hupei, now commands 13 or 14 taels a bale instead of 10 or 11 taels.—*Board of Trade Journal*, Aug. 28.

COTTON AND COTTON SEED INDUSTRIES.—According to the annual report for 1901 of the British Chamber of Commerce of Egypt, the cotton crop of Egypt this season will prove to be a large one about 6½ million cantar, [Cantar=99 pounds], but the quality of it has been considerably damaged by fogs and rain. The question of quality is being much more studied by intelligent cultivators, and efforts are being made towards a more careful selection of sowing seed. This attention is certainly necessary, as there has been a noticeable falling-off during the last two or three years in the quality of the Mit. Affifi cotton, which is the main cotton of the country. Yannovich and Abassi qualities have again been cultivated with success, and some fine samples of each have been produced. Yannovich has especially found favour, the fineness, length and strength of its staple has made it a suitable for American Sea Island cotton, the crop of which has been short in the last year.—*Board of Trade Journal*, September 4.

SOIL ANALYSES.—Many people hold erroneous ideas as to the value of soil analyses, some speaking as though they only required to have the soil analysed to know what manures to apply to certain crops to obtain the best returns. This, however, is far from being so. In the first case, it would be nearly impossible to obtain a sample that would fairly represent even a ten-acre field. Besides this, an analysis will only show what the soil contains; it will not tell whether the plant food is in such a condition that the plants can make use of it, neither will it tell him what treatment the soil requires to make that plant food available. So many other things, such as the physical condition of the soil and subsoil, its ability to retain moisture or perhaps the reverse, have to be taken into consideration that (except to the scientist) a soil analysis is just as likely as not to prove misleading in dealing with the manures such a soil requires. The only guide is experience. Find out what others have done under similar conditions, and prove by experiment whether the treatment beneficial in their case is equally so in yours.—*The Planters' Monthly.*

GAMBIA.—The quantity of rubber exported in 1900 was 125,446 lb, in 1901 146,573 lb. being a decrease of £1,254 in value.—*India Rubber and Gutta Percha Trades' Journal*, Aug. 4.

INDIAN TEA COMPANIES FOR 1901-2.—Mr. George Seton shows that about half of these companies show increased profits, as compared with the previous year, while the other half have had their profits reduced. Taken all round the profits were larger than in the previous year, but the amount distributed in debenture interest and dividends was much smaller. The total net revenue works out at £319,000, as against £279,000 in the previous year, and the average rate of dividend, including debenture and preference interest, is 2·72, as against 3·90 per cent. This lower return, in spite of bigger takings, is not due altogether to increased capital on which distribution has to be made; but may be attributed to the more cautious policy of the directors in keeping larger sums in hand, so that whilst the aggregate capital has only grown 4 per cent, and is accounted for by the fresh issues of four concerns, the total sum placed to reserve and carried forward has expanded more than 15 per cent. The production per acre fell from 487 lb. to 421 lb., but the profit per lb. increased from 0·85d to 1·03d, and the sale price was nearly a third of a penny per lb. better. The ratio of operating expenses to receipts was 86 as compared with 88 per cent, and the profit on the total capital employed is equal to 3·50, as against 3·20 per cent. The situation revealed by this carefully compiled table is that each garden or group of gardens should be considered by itself, and that it is difficult to generalise on the whole industry from the results of any particular working.

WEST INDIAN ESSENTIAL OILS AND ALOES.—At the Agricultural Conference held recently at Bridgetown, Barbados, under the presidency of Dr. D Morris, C M G, Imperial Commissioner of Agriculture for the West Indies, Mr J H Hart (Trinidad) read a paper on "The Preparation of Essential Oils in the West Indies," an industry which in the past has mainly been connected with Dominica. Mr Hart exhibited specimens of fifteen kinds of essential oils, which he had prepared from plants grown on the lands of the Botanic Department, Trinidad. He discussed the various oils, described their mode of manufacture, and suggested steps which might be taken to encourage the industry. Dr. H A Nicholls (Dominica) and Mr W Fawcett (Jamaica) discussed the paper. the latter exhibiting a specimen of the oil of *Cananga odorata*, which he had prepared. Mr W G Freeman, technical assistant, Imperial Department of Agriculture, also read a paper on the "Aloe Industry of Barbados," which had now almost dwindled away. Mr Freeman pointed out the former magnitude of the industry, the ex ports being sometimes of more than 7000*l.* per annum, described the soil, cultivation and manufacture, indicated the detective methods which led to the decay of the industry, and made some suggestions for the future. Living specimens of Curaçao and aloe plants were exhibited. The paper was Barbados followed by a discussion, to which Prof. Harrison (British Guiana), Mr Francis Watts Leeward Islands), Mr W D Shepherd (Barbados), and the President contributed.—*Chemist and Druggist*, August 30.

IRRIGATION IN INDIA.—The scale on which irrigation works are provided in India is not, we fear, appreciated by those who denounce official neglect whenever a famine occurs. We learn from an Indian paper that the irrigation statistics for 1901-02 break the record. The previous maximum area under canal irrigation in one year was 18½ million acres. The area now under irrigation exceeds 19½ million acres.

CASSAVA.—An important Experiment.—Swift and Company and other Chicago packers, have begun experiments on a project for shipping stock to Florida and fattening it on cassava root. This project was broached about year ago by southern men and representatives of the Louisville & Nashville and an investigation was made. It was found that cassava would grow well in waste land in northern Florida and southern Alabama and was a splendid cattle feed. Investigation so far made it appears that it would be much cheaper to send stock to Florida to fatten than to the western ranges. It is said that 1,000,000 acres in the South are available, much of it government land, ready for homesteaders. The value of cassava as pig food and for making starch is being looked into. The project will be undertaken gradually, and ultimately may result in large and profitable changes to the packing industry.—"News Bureau," Boston.—*Jamaica Agricultural Society*, August.

PLANTING MANICOBA RUBBER IN SERGIPE.—In a report on the little state of Sergipe (Brazil), the coast line of which lies between the ports of Pernambuco and Bahia, the United States consul, Mr Henry W Furniss, mentions that in 1898 the state appointed a commission to report upon the introduction of the Ceará variety of rubber for cultivation, should improve advisable. The commission visited Ceará, where the Manicoba rubber trees were originally found wild and are now under extensive cultivation, and as a result of their investigation Manicoba has been planted in various parts of Sergipe. The consul has seen two plantations, one with about 17,000 trees and the other with more than 20,000 both three years of age and apparently in a flourishing condition. Manicoba is grown from seed, planted at the commencement of the rainy season, 12 to 15 feet apart, usually three seeds to a hill, the most vigorous resulting plant being left to stand. Some planters file one end of the hard seed—which much resembles the seed of the castor bean—to assist germination; others soak the seeds before planting, but generally the seed is planted without previous preparation. It is said that the plant will grow on rundown sugar lands. It is cultivated on the sandy soils of Ceará, but it doubtless will succeed best on good farming land. The tree requires little attention, in many places the soil receiving no cultivation, and reaches a height of from 12 to 36 feet in four to six years. It yields rubber at a very early age, the average stated at about 2½ years from planting, when from 7 to 35 ounces of rubber may be obtained in a season. Rubber is obtained by removing from the trunk a V shaped piece of bark, to the lower angle of which a small vessel is placed to collect the *latex*. Coagulation is assisted by smoking, as in the case of Para rubber, though the *latex* will coagulate spontaneously in the air. The cost of planting and gathering the initial crop is stated to be less than in the case of coffee, sugar, or cotton, while the profit is greater, and the consul believes that the new industry will become important.—*India Rubber World*, Aug. 1.

GRAPHITE (PLUMBAGO).—In the State of Travancore there are four mines from which graphite was extracted in 1901-02 to the amount of 2,490 tons. No information has been given of the quality of the graphite. It is doubtless exported, but no particulars of the trade have been furnished, nor are the capabilities of the mines known.—*Indian Agriculturist*, Oct. 1.

PLANTING IN MYSORE.—At an extraordinary General Meeting of the South Mysore Planters Association held recently the subject of the Coffee Cess was discussed, and the proposal that the Agents should be asked to raise their rates by Rs 5 per ton to provide for the Coffee Cess met with very little support. As regards limitation of advances to coolies, it was unanimously agreed that advances should be limited to Rs 20 per head.—*Pioneer*, Oct. 9.

THE PEPPER TRADE OF SIAM appears to be improving, though not extending in area. Last year the exports amounted to 1,156 tons, and the prices varied from 8¼d to 9¼d in the London market. Prices have a tendency to rise each year. The latest account says that this year pepper is coming in rapidly, but the export will probably only amount to 70 per cent. of that of 1901. Prices have been steady for the new season's pepper, which began to come in at the end of March. Most of it comes to London.—*Globe*, Sept. 12.

CEYLON TEA FOR THE PHILIPPINES.—We direct the attention of the "Thirty Committee" to a letter of an American gentleman, Mr. Dunleary, written from Mindinao in the Philippines, which has been prompted by his reading in the *Tropical Agriculturist* of the efforts made by Ceylon planters to push their teas. He points out that there is an excellent field to be exploited in the Philippines—where inferior China tea is now chiefly used—and that the Americans who once got used to the flavour of Ceylon tea would carry the taste back with them to America and there demand the same tea. What surprises us in this connection is that an enterprising Ceylon man like Mr. Tom Stephens, the well-known Dentist, established for some time in Manila, has not put a tea merchant there up to importing from Colombo, or gone in for a trial shipment himself. He will in due course read Mr. Dunleary's letter and may have something to say about its contents. Meantime the "Thirty Committee" should pass a hearty vote of thanks, in the name of the whole body of our tea planters, to Mr. Frank J. Dunleary for the testimony he bears as to the repulsive nature of much that he himself has seen in connection with the preparation of China and Japan teas. This testimony ought to be reprinted in large type above Mr, Dunleary's name, for circulation all the world over, but especially in North America. Owing to some blundering at this end which we cannot understand, Mr. Dunleary's letter, which is dated May last, only reaches us now. He encloses a second letter for the "Planters' Association" in which he mentions a Manila Tea House as suitable for an Agency for Ceylon Tea. But Mr. Dunleary has to learn that the planters or their Association do not establish Agencies. That must be done by the merchants of Colombo in the regular course of business.

CINNAMON IN LONDON.

It is of interest, after our reference on the 19th Sept. to the *London Commercial Record*, to turn to the specific expert report on the last quarterly sales of cinnamon—the source from which we have chiefly quoted for many years past. From the report, which bears date the day after the auctions, we learn that the quantity offered was a fair average one of 825 bales—the offerings at the corresponding sale last year having been 858, and in May this year 433. Had London been our only market for the famous Ceylon spice, as it was practically until the opening of the Suez Canal, the smallness of the previous quarterly catalogue would have led to keen competition, and to an advance in prices; but, as the *Commercial Record* observed, the Continent is supplied direct through its own Ports, to which generally foreign merchants now ship produce direct from the producing country. As a matter of fact we sent to the United Kingdom less than one-third of our quilled cinnamon—812,280 lb. out of exports totalling over 2¾ million lb—and 239,000 lb. chips out of over a million and-a-half! Germany took almost thrice the quantity of chips and about 57,000 lb. quilled bark more than the United Kingdom; while Belgium, Italy, Spain and America, all ran into pretty high six figures. Though London no longer holds the proud position she did in the spice market, she doubtless has among her constituents in the spice trade some of the best of her old customers. While it must not be forgotten that the volume of trade has about trebled, so that London attracts perhaps as much as she ever did in ante-Suez Canal days; while it is also a fact that the highest priced cinnamon continues to go to London. In the report before us, for instance, First quality of worked cinnamon fetched up to 1s 8d; seconds up to 1s 7d; thirds up to 1s 5d and fourths up to 11½d. We doubt if even one bale of cinnamon has changed hands locally at anything approaching these prices. The prices paid in the Fort for Firsts, we understand, are about the equivalent of what fourths from good gardens like Goluapokuna fetched at the London Quarterly Auctions. If the Continent of Europe and America draw almost all their supplies from Colombo direct, London still continues to monopolise our best marks, chiefly it is believed for old Spanish and Italian houses which ask for the finest quills the island can turn out; and if its prices no longer regulate local rates, yet London pays for what it likes, double the prices which are quoted in local Price Currents!

As we said, the prices which ruled at the last auctions did not advance as expected because of the smallness of the offerings at the previous sales; but such as they were, they leave no cause for dissatisfaction. Previous rates were generally maintained, and where there was a fall it was easily explained. Altogether, as has been remarked, the spice market was about the only one in which produce showed some animation last month; but heavy shipments have gone forward since then; and we are not sure that the next sales will show as good an average. Any way, the stocks are not heavy; and there is hope in that. Elsewhere (see page 7) we give the usual London Report on last sales.

SALT IN THE SOIL IN INDIA AND CROPS.

The soil in some parts of the country is very salt and so is the water of many of the wells. As it is important to know how far this affects their value for agricultural purposes, Dr. Leather, Agricultural Chemist to the Government of India, has investigated the effect of the salt on crops. He has found cereals growing well in soil which contained 0·099 per cent of sodium carbonate, and 0·018 of sodium chloride in the Cawnpore District. In the Aligarh District, wheat grew well in one case in the presence of 0·044 per cent of carbonate *plus* 0·021 of chloride, and in another in the presence of 0·137 per cent of carbonate *plus* 0·062 of chloride. The crop failed, however, in the presence of 0·193 per cent of carbonate *plus* 0·01 of chloride in one plot, and of 0·251 per cent of carbonate *plus* 0·008 of chloride in another. It is remarkable that such a small difference should be found in the amount of salts present in the soil when the crop grew well in the one case and failed in the other, but this is confirmed by similar results obtained in California. Dr. Leather finds the explanation to lie in the respective amounts of rain-water which the several soils would allow to enter at the surface. The word 'drain,' he says, cannot here be properly used, because the presence of these salt is a proof that the drainage conditions are extremely imperfect. But one soil will allow more water to descend into the surface soil than another. This would produce more dilute solutions of the salts in the one case than in the other, and it would explain why considerable differences in the growth of crops may occur in soils which contain much about the same proportion of salts. It is, indeed, a question of concentration of solutions that must be considered rather than weight of these salts per hundred parts of soil.

The water of many saline wells is used for irrigation. For instance, in the Muttra District of the United Provinces the water of such wells is considered by the people in some cases to be fit for application to the land before sowing, while in others it is applied to growing crops. Dr. Leather finds that in the latter case there is often a considerable proportion of nitrates in the water. In Gujerat he has observed that when the amount of total salts is high, the water is mixed with that from less saline wells. When the water does not contain a good proportion of nitrates, it cannot be used for irrigation in the absence of a good rainfall. Used alone in dry weather, such water is practically fatal to crops. A distinct line cannot be drawn between waters which are fatal and those which are not, but Dr. Leather finds that the most that crops such as cereals will bear is a solution containing 0·5 per cent of salts.

More generally, Dr. Leather finds that crops may suffer in solutions of 0·3 per cent of total salts, those which are most easily affected being the *Leguminosæ*. In order to compare this result with that showing the proportion of salts in soil, he says that it may be assumed that the proportion of water in soils varies, shortly after irrigation, from 30 per cent to 10 per cent according to the nature of the soil and the climatic conditions. A soil containing 0·1 per cent of salts and 30 per cent of water may thus be considered as holding a solution of 0·33 per cent of salts. Dr. Leather infers from the agricultural effects of well waters that such a proportion is as much as cereal crops can bear. He therefore considers that a soil containing so high a proportion as 0·1 per

cent of total salts could only be expected to bear good crops if the water supply were regular throughout the season.—*Madras College Magazine.*

THE SAPPHIRE MINES OF ANAKIE, QUEENSLAND.

During my recent visit in Central Queensland I was asked to visit the sapphire mines of Anakie, 200 miles west of Rockhampton by rail. From Anakie railway station to the nearest mines, on Retreat Creek, is nearly eight miles. The oldest and most extensive rock masses in the Anakie district are granite and its varieties, assumed to be of metamorphic origin. Gneisses, schists, and slates rest against the granites, and are everywhere found in contact with them. Intrusive rocks, acidic and basic, occur throughout. The former, consisting of pegmatite, felspar, porphyry, and felsites, are in great abundance, and traverse the granites and gneisses in all directions. The basic rocks are hornblendic, and are either massive hornblende, or else diorite. There are also outcrops of massive epidote rock and garnet rock in places. There is a younger formation, making a break between the other rocks. This consists principally of shales, sandstones, and conglomerates. The remnants of the pre-existing formation consist of boulders of hard flinty quartzite, of general occurrence in Central Queensland, and designated "billy." It occurs exclusively as boulders in the alluvial sapphire deposits. The sapphires are distributed over a large area, but nearly all are confined to the granite country. The deposits occur on the banks of the creek, but very rarely are they found in the beds of the present streams. Sapphires are found in the basalt at an altitude of 500 feet above the highest alluvial deposit.

In addition to gems there are found black tourmaline in abundance, titanic iron, pleonaste, and magnetite. At Sheep Station Creek there is a small outcrop of schist, sections of which show it to be hornblende, quartz, and red garnet. Policeman Knob, close to Policeman Creek, is remarkable for the number of white and coloured zircons found in the alluvial deposit below the basalt, but so far no sapphires have been got from the deposit.

The thickness of the gem deposits varies from a few inches to several feet. The bottom is usually a reddish clay, and below this clay another and sometimes richer deposit has been found. The sapphire wash is frequently clayey, and requires "pudding" before the gems can be extracted, but much of the wash is loose and friable, the sapphires being obtained by "dry sieving." In several parts of the field the wash is of enormous thickness, but very little prospecting has yet been carried on.

THE SAPPHIRE FIELDS.

The field is divided into four camps; I found the wash varying greatly in thickness. The wash includes, in addition to several varieties of "billy," red and brown jasper quartz, fibrous hornblende, magnesite, tourmaline, topaz, pleonaste, rock crystal, and several varieties of chalcedony. Several rubies have been found, which, compared to the blue, green, and yellow sapphires, are exceedingly rare. Some very fine stones have been found on this field, amongst them two very fine yellow, weighing nearly 50 carats each. The blue stones found are, as a rule, dark, but the green stones, when free from flaws, are very fine gems. Some fine hyacinths, a variety of the zircon, are also found at times. On Hunt's claim, one of the best on the field the stones found were large blue and others of a beautiful light yellowish green. Zircon, garnets, and amethysts have also been found. I saw a fine yellow sapphire weighing close on 80 carats, and some fine green stones. Crystallised corundum has been found on this claim. One of the most brilliant yellow stones ever obtained, and which after cutting weighed 33 carats, was got in this mine. The Policeman Creek camp is celebrated for a diamond weighing 1¼ carat, found in M'Chrystal's claim. The miners thought it was a white sapphire, but during Mr. Dunstan's visit he set them to rights on that point. It is quite probable that others were found previously and sent away with parcels of stones, as two other diamonds have since been found on Retreat Creek. Large sapphires are found on Iguana Flat, but from there to the lower end of Policeman Creek there is a gradual diminution in the size of the stones, although the blues of Iguana Flat are not as good in colour as those on the creek. The green sapphires found on the Central Creek are often of a brilliant shade. The sapphire deposits are, however, most extensive on Tomahawk Creek. Mr. Dunstan says that in places they are a mile in width and several miles in length. Occasionally there is a break, but otherwise they wind about on both sides of Kosky's Creek. The total distance along which the deposits are found in this camp is about 15 miles.—*Sydney Mail*, Sept. 6.

CEYLON TEA ON THE CONTINENT OF EUROPE.

Mr. J. H. Renton sends us three pamphlets bearing on Ceylon Teas. One is in Russ very prettily got up with 20 fine illustrations showing all the operations of tea planting and manufacture and even of despatch by steamer, with appropriate letterpress. Another in French "Rapport sur le The de Ceylon" by Dr. Doorkovitz and a third in German, a translation of the latter. The Russian chemist who writes these is well-known in the scientific world and in 1890 he gave some lectures at St. Petersburg upon Tea, especially showing its alimentary value. Not only is tea valuable as a stimulant, but it serves to create the heat necessary for the functions of the body. A table follows shewing the amount of caloric required every twenty-four hours and the quantities of hydrates of carbon, of albumen and fat required for the production of so much heat or energy, by means of which the functions of the body are carried on. To understand the influence of tea as a factor in the alimentation, one must study the two tables given, drawn up by Messrs Franklaud and Pavey, shewing the relative value of each food for muscular work, also the weight of nourishment necessary and the quantity to maintain a working man. In the table we note that the energy created by the consumption of so much carrots and potatoes—or of a much smaller quantity of beef-fat is the same. It followed then that with the man who lives on carrots &c., a considerable amount of energy with have to go to digest the food and he will never have the activity he might have had, if he had taken a more substantial food, of less volume.

In order to understand the place of tea in alimentary economy, we must study its analysis which is fully given and it is explained how tannin oxydises the blood and by combining with the albuminous matter of the tissue of the body hinders their destruction. The theine is doubtless nerve tonic, say they, and acts in the same way as would alcohol.

All this will appeal to Continental readers in their own languages.

GARDENING ON TEA ESTATES.

(*For "Indian Gardening and Planting"*)

In Indian Gardening and Planting of 17th July 1902, you ask, under the heading of "Gardening on Tea Estates," "Why should not every tea planter in India turn his attention to the cultivation of the beautiful in nature? . . . The tea planter has every facility for successful gardening ready to his hand."

The answer to this question is not far to seek; and it is this: Few men or women *have it in them* to take the trouble that successful gardening requires. A man who has it in him to do this, will teach himself gardening almost under any circumstances. There is no recognised institution in India to which a youth, who is intended for a planter, can be sent to acquire a love of plants, and the rudiments of the way that they should be dealt with, in order to make them respond to one's wishes. Most children are fond of flowers—some are passionately so—and would intelligently learn a good deal about them, if they are taken early in hand by some one who knows how to deal with children's brains, and to put in them the best and lasting notions. But this natural love of plants is allowed to be frittered away by all sorts of distracting notions; so that after a time the child begins to look upon the time and trouble of attending to plants as a bore and is always wanting to do something else; as the child grows into a boy, with all manner of distracting thoughts, it is hopeless in most cases to try and win him back to gardening.

As men get old they begin to lose interest in this, that and the other pursuit, but if in their childhood and youth they have had their love of plants fostered, and have acquired the rudiments of gardening, that pursuit they will *never* tire of. In their spare moments they will be always in some garden, or wild place prying into the ways of plants and flowers. It is doubtful whether a child or a boy will take to plants unless he has it naturally *in him*, and feel a pleasure in discovering their secrets, or at all events in learning something about their ways. Parents are a great deal responsible for not having children taught more about gardening than they do. For instance, what is the first thing a mother in London thinks of doing when her children return home for the Christmas holidays? The first thing she thinks of is to take her boys and girls to the Pantomime, to see what?—a regiment of pseudo-nude girls dancing in a ballet and a lot of imbecilities in the bargain. The boy probably has awakened in his brain convolutions something very different from gardening, when he beholds those troops of girls rigged up in imitation nudity—something to dream of for months while he is trying to read his books on returning to school. I once asked a little girl, who was with her mother for Christmas holidays, this question: How long does it take you to gather up your thoughts again for renewed school work, when the Christmas carnivals are over? She replied *about two months*. The boy probably takes longer. Mothers are mostly ignorant, and do not understand the automatic action of the human brain; and that when she puts the exciting glamour of a pantomime into a child's head it is difficult to put it out again; and most of these boys and girls are supposed to be in training for making their own way in the world later on. I do not suppose that more than one per cent of mothers look upon the future lives of her children as a life of struggle for existence. Pantomimes don't appear to help one much in that direction. It is only today in one of the papers I read that in a certain technical school they find a difficulty in getting students to come to be taught! The youth's brains are stuffed with a craving for amusement. I know of an official in India who had a son in London training for the Indian Civil Service. He failed. Then he was coached for the Army. He failed again, and finally he was turned into a tea-planter. Not improbably in his new function, whatever that may have been, after the day's work he wound up in some verandah with his legs on the long arms of those curious chairs, smoking and drinking whisky and soda. How could such a creature take to gardening, in spite of "every facility for successful gardening ready to his hand." Probably he never knew even, or had the sense of observing that plants had sexes like himself! It is true that great efforts are now being made to bring boys and girls face to face with the realities of nature in what are called "nature studies." But with the dreams of a pantomime in his head what can a boy care about beetles and nettles? If the boy has it in him, and his father intends him to become a planter, there are facilities for training him in a knowledge of plants and their ways both in the Royal Gardens at Kew, and in the Horticultural Gardens of India. But do they, or will they take advantage of these institutions? I was, on one occasion, in the principal hotel in Kandy for a month. Periodically bachelor planters used to come down to the hotel, have a "blow out," and get tipsy, and make a row. The ennui of life with such creatures must have been great, and they had no outlet for their energy beyond that of driving coolies. To such persons a love of gardening would have been a Godsend.

LONDON, Aug. 22nd, 1902. E. BONAVIA, M.D.

—*Indian Gardening and Planting*, Sept. 18.

CEYLON GAME PROTECTION SOCIETY.

Copy of minutes of a general Committee Meeting of the Ceylon Game Protection Society, held at the Hill Club, Nuwara Eliya, on Saturday, September 20th.

Present:—Hon. Mr. H Wace, Chairman, Messrs. C H Bagot, P R Shand, C C Wilson, J Wickwar, M J Kennaway and T Farr, Honorary Secretary.

The minutes of last meeting were read and confirmed.

Messrs. C C Wilson and M J Kennaway were proposed as members of Committee and duly elected.

The Honorary Secretary submitted a letter from the Colonial Secretary (No. 09,092) of June 13th, 1902, explaining circumstances and correspondence antecedent thereto with amended form of licence proposed by him.

The amended form was approved by the Committee and the Honorary Secretary was authorised to submit the same to Government.

The Honorary Secretary submitted a question of retention of watchers on the Meda and Kadawata Korales, Sabaragamuwa. Resolved:—"That the G. A, Sabaragamuwa be requested to be good enough to inform the Secretary, how these watchers are employed, and under whose immediate supervision, and to give a return of all cases instituted under the Game Protection Ordinances with result of same."

The Honorary Secretary brought to notice of the Committee, the question of the altering of the close season of the Eastern Province appearing in the Government *Gazette* No. 5,838—of March 22nd, 1902. Resolved:—"That previous to the altering of close seasons in any Province, the

Government Agent be requested to kindly submit the proposal for the opinion of the Game Protection Society's Committee."

The Honorary Secretary read out the Proclamation by Government of June 30th, 1902, relative to the export of horns of sambur and spotted deer and proposed that the Game Protection Society desires to record its thanks and full appreciation of the act of Government in issuing the said Proclamation.

The Honorary Secretary submitted particulars of a case of hunting by coolies in Maturatta in Crown forest and his letter to the Hon. the Colonial Secretary on that subject. It was resolved :—"That no further action was adviseable in the particular case reported."

A vote of thanks to the Chair terminated the meeting.

Before the business of the meeting had commenced Mr. P B Shand inquired whether the admission of the Press reporters was in order, as they were in Committee and it was unusual to discuss matters of a private nature before the said representatives. The Honorary Secretary expressed his desire that the meeting should be reported, as there would be several matters coming forward, which it would be desireable to make public through the medium of the press.

Mr. C H Bagot expressed his regret that Haputale was not represented at the meeting and the Honorary Secretary stated that he had called the attention of Messrs. J R Barkley and W Ormiston to the meeting by post cards in addition to the usua notice in the newspapers. With regard to the first subject under discussion by the rule prohibiting shooting in the Hill Reserves above 4,000 feet the Honorary Secretary gave a sketch of the history of the subject from the date of its origin terminating it with the letter from the Hon. the Colonial Secretary of June 13th, 1902. That letter being the immediate cause of the present meeting. The facts of the case are briefly these. Some two years ago the shooting of sambur in the Hills round about Nuwara Eliya by Tamil coolies and other pouching rascals had become so prevalent that the C G P S appealed to Government to put a stop to it, in the interests of sports-men generally. Hence the rule was made. It was, however, too comprehensive in its scope, and some objections to it were raised by certain members of the Society resident in Uva. On October 17th, 1901 at a general meeting of the Society attended by representatives from Haputale, the matter was thoroughly discussed, and a resolution in the form of an amendment was carried unanimously as follows :—

"That where registered packs of hounds are kept the killing of sambur be confined to stalking with the rifle at any elevation and to killing with the knife and hound."

The Hony. Secretary on October 30th laid the matter before Government forwarding copy of the resolutions passed at the meeting and on November 20th received a reply which entirely failed to help matters on at all. On April 2nd, 1902 at a General Meeting of Society the subject was again brought up and again a resolution was passed emphasising the amendment passed at the preceding meeting.

The Hony. Secretary drew the attention of Government to the proceedings of the two meetings and received a reply dated June 13th 1902,

"Requesting him to forward a draft of the license, which would meet the wishes of the G P Society as some difficulty was experienced in comprehending its precise wishes.

The above retrospect brings the question up to the proceedings of the meeting now under review, and the following draft of a license with amended conditions was submitted by the Hony. Secretary as meeting the wishes of the Hony. Secretary of the Haputale branch in accordance with the proceedings of the two general meetings of October 17th and April 2nd.

Conditions of License referred to :—

I. Shooting at night and netting are prohibited.

II. This license is not transferable and can only be used by the person named in it.

III. Hunting by men in gangs carrying sticks or guns with or without dogs is prohibited.

IV. "Shooting elk and spotted deer within the Hill Reserves above 4,000 feet is prohibited except with the permission of Government in writing. The only modes of killing elk and spotted deer allowed within such reserves is hunting with dogs to the knife or stalking with the rifle."

This form of license being unanimously adopted by the meeting. The Hon. Secretary was requested to forward a copy to Government for approval.

The Hon. Secretary then brought up the question of the retention of the two game watchers employed in the Meda and Kadawala Korales of the Sabaragamuwa District, stating that he was dissatisfied with the lack of information from the Katemahatmaya of those Korales with regard to what had been done by them. He (the Hon. Secretary) submitted that the country, wherein these watchers were employed, was not in any sense a sporting country and he was doubtful whether the G. P. Society benefited in any way by their employment and remarked that they would be far more useful in the Province of Uva as it was very desireable that the game as it overflowed the boundaries of the Yala Sanctuary should receive immediate protection. The Hon. Secretary also mentioned that when passing through the very centre of the country supposed to be patrolled by these watchers he received numerous offers from the villagers to get up deer drives and this was in the close season. The Ratemahatmaya, however, of the Koralcs referred to, has reported to the Hon. Secretary that much good has heen and is being done by the watchers, Hence the resolution which was carried at the meeting.

In introducing the subject of hunting by coolies in Maturata District during the close season of this year the Hon. Secretary explained that he had received a complaint from Mr Thorpe, of Ellamulla estate, requesting the services of one of the game watchers of the Society to assist him in detecting a gang in the act of hunting. There appears to have been some mismanagement for instead of waiting until the gang was actually engaged in pursuing or attempting to capture sambur, they were seized in the Crown forest and their guns and dogs taken from them. The Hon. Secretary, pointed out that the charges of the guns which were drawn and examined, consisted of bullets, slugs and heavy charges of powder and that the men had undoubtedly entered the forest with the object of killing sambur.

Proceedings, however, were not instituted owing to their not being detected in the act of shooting at, or killing sambur,

The Hon. Secretary then drew attention to the amending Ordinances No. 11 of 1902, and quoted the following therefrom :—

Sec. 3 sub-Section (5) " a License to shoot at, kill, capture, pursue, or attempt to capture game, shall be subject to an annual stamp duty of R3'50.

Sec. 6 sub-Section (c). Any person who in contravention of this Ordinance or contrary to the tenor of any License issued to him shall shoot at, kill, capture, pursue, or attempt to capture game, shall on conviction be liable for such offence to a fine of R100 or to simple or rigorous imprisonment for a period not exceeding three months or to both.

In view of the lapse of time that had occurred since the alleged poaching it was thought inadvisable to re-open the question.

A TEA COMBINE IN JAPAN.

The question of a tea-combine seems likely to be revived in Japan. This time the idea emanates from the tea growers of Fukuoka, Kumamoto and Nagasaki. So far the proposal is only in the initial stage, although a number of people are anxious to push the matter through. With this end in view representatives of various bodies interested in the tea business have been holding a conference at Nagasaki.—*Hongkong Weekly Press*, Sept. 8.

PRODUCE AND PLANTING.

" The value of TEA, COFFEE, and COCOA imported into the

UNITED STATES

in 1902 was $87,426,000 as against $146,275,000 in 1892, which is a great falling off," says "Tea, Coffee, and Sugar" of New York; "but the figures for the present year are the largest since 1897, when they were $1,000,000 000. In view of the tremendous imports of coffee the figure is surprising for the year, but it demonstrates the lessening values of the staples from year to year. The coffee we now drink does not cost so much, nor the tea either. Their quality, too, is not so high as formerly. The value of the tea imported this year was little in excess of $9,000,000, whereas in 1875 it was $22,675,000. Since then the population of the country has grown from forty to eighty millions, but the quantative value in dollars of tea has decreased almost two-thirds. An inference is that the tea trade since then cannot have grown, and this, too, despite the enormous expansion of trade in the country. Coffee has done better, but the imports in 1875 amounted to $50,000,000, whereas the value of them for the fiscal year just closed was only $70,000,000. In 1875 the amount of coffee imported was 317,879,000 lb, but during the year just closed it was 1,091,792,000 lb, for the first time the billion mark was crossed. Our consumption of coffee has increased threefold, whereas the population has only doubled itself. Of tea in 1875 we consumed 65,000,000 lb, and this year it was only 75,000,000 lb, which is a retrogression relative to the increase of population.

The scene of the

AUCTION SALES OF TEA

in MINCING LANE does not exactly represent an earthly paradise, and it is oftentimes suggested that there is room for improvement in the method of conducing the auctions. There are frequent complaints on this score, and quite recently a growl has been uttered because the buying brokers include in their lists of "bought-over" teas which they distribute among the trade those parcels for which selling brokers have accepted their bids. The *Grocer*, we notice, says this complacence is ridiculed by the majority of the trade. It points out that "as it is quite at the option of the selling brokers whether they accept or refuse these bids, it seems unnecessary to raise an outcry against the practice. No buyer is prevented from offering more money for any teas for which bids have been made, though the original bidder has the first claim, provided, of course, he is prepared to pay the increased price. In the main the owner gets the fair market price for his tea, and no doubt will continue to do so unless there are philanthropists in the trade who are willing to bid above their fellow-operators in order to benefit the importer. With regard to crying off bids that have been made this has been an unpleasant and growing practice within recent years. The question, however, is one that rests entirely with the selling brokers, for if auctioneers would only show a little more backbone by firmly insisting on their decisions being carried out there would be better order than at present prevails in the conduct of the tea sales. Where auctioneers have hesitated and wavered in deciding who was the first bidder nothing but confusion and disorder have resulted. It would also be a good thing if the brokers were to bring pressure on the importers to allow the buyers a profit on the odd chests that are sometimes withheld from a break, being kept back either for the merchant's own use or else for a 'friend in the country.' Frequent protests have been made against this proceeding, and frequent promises made of the subject being brought before the importer, but the outcome so far has been nil. Again there are occasions when breaks of a hundred chests or so have been sold, although offers have been made of a farthing more and 'drop' on condition that the parcel was divided into two lines. This means more money for the importer, but the offer has not always been entertained, and it is a pity that some definite rule is not made upon the subject. Many invoices also contain duplicate breaks of the same description of tea that might be bulked together, thereby saving time and the trouble of tasting an excessive number of samples. The trade are continually complaining about all these matters, and if they were duly recognised and provided for the procedure at the auctions would be characterised by a greater smoothness and less uproar than at present characterises the tea sales."—*H and C Mail*, Sept. 12.

TEA STATISTICS AND PROSPECTS.

The introductory portion of Messrs. Wm. Jas. and Hy. Thompson's Tea Circular by a late mail deserves to be carefully noted :—

Although good business is now being done the market lacks animation, and the news of light shipments from India has not received the notice it deserves at a time when deliveries for home use and export are steadily growing larger. Some of the buyers seem to be more intent upon discussing what is passing at the moment than upon making provision for the future, with the result that bidding at Auction is brisk at one time and languid at another, while prices are subject to much irregularity.

The movement, however, towards a high level of value for fine teas, accompanied by easier rates for inferior kinds, continues : it is helped by the action of buyers abroad who show much discernment and bid freely for Indian and Ceylon tea of the best flavour and quality. Judging from our own information, they are probably right who buy fine tea when they see it and also recognize that when it is scarce the good teas next in order of merit become more valuable.

There are signs that business with America this season will be larger than hitherto and may reach considerable dimensions if suitable teas be made in sufficient quantity to convince American traders that we can produce "Green tea" with the flavour of Moyune and "Uncoloured tea"—or "Unfinished tea" as some in Canada name it—equal in delicacy to the best from Japan. Both descriptions should be made. Our friends Messrs J & J R Montgomery & Co., of New York, inform us that they estimate the importation in North America this season will be as follows :—

	1902-3.	1901-2.	1900-1.
From China and Formosa	51 mils. lb. agt.	40 mils. lbs	54 mils lb.
„ Japan	38 „	36 „ „	38 „
Total ..	89	76	92

This is so far encouraging, and we notice that the London stock of Ceylon tea on 1st September was considerably less than at the same date last year ; but unfortunately Indian tea was 3½ million lb. in excess and China tea 4¾ million lb. above the stock of September, 1901. Finally from a Statistical sheet issued by Messrs. Ewart, Maccaughey & Co., Ltd., we quote the following, *quantum valeat* :—

CROPS OF THE WORLD.

	1901-2. Millions.		1900-1. Millions
Indian ...	175¼	..	187½
Ceylon ...	143	...	149
China and Japan (Exports from)	154½	(Exports from)	184½
Java ...	18¾	...	17¼
	491½		538½

MESSRS. BROWN AND DAVIDSON'S TALAWAKELE WORKS.

EXPERIMENT WITH LIQUID FUEL.

So much has been recently written about the attempts made to utilise liquid fuel in oil engines as a motive power that having heard of an experiment at the well-known works of Messrs. Brown and Davidson, Talawakele we sent our Upcountry representative there to witness and report on the success of that firm's latest venture. Our representative was cordially received and shown the engine experimented with, which was a Priestman Hull oil engine, selected because it was not of date and had not been worked for several years. After Messrs. Brown and Davidson's chief engineer had removed all the complicated gear, he substituted a simple valve gear. The engine was put through successful tests. The engine is of small construction, but nevertheless it started readily and easily, and developed a little over 4 horse-power pressure on a continued brake test. Our representative was informed by Messrs. Brown and Davidson that far from being prohibitive the alteration necessary, on this old and obselete type of engine—was effected at a low cost. But the firm while they are prepared to alter any engine at use at present to work by liquid fuel—they, at the same time, do not advocate it, as the result of what its motive power would be after two or three years of continued work has to be tried and tested for some little time before they would express their opinion as to its proving the success which is now anticipated in very many quarters. Our representative was also taken to Middleton estate, owned by Mr. A V Renton, where within a few hours yesterday (Monday) Messrs. Brown and Davidson changed an oil engine of the latest pattern which had hitherto been

WORKED BY PETROLEUM TO WORK WITH LIQUID FUEL.

The engine was one of their own "Cundall's" and of 25 brake power, and had been working quite smoothly with liquid fuel for some hours. There our representative met Mr. T MacLachlan who has something to do with the management of that estate, and was told by that gentleman that it was his opinion that liquid fuel would supply a long-felt want upcountry where firewood was scarce, and had to be brought from distances by wire shoots which had to be erected for the purpose at much cost. Mr McLachlan's view was that it would in time be largely used as it meant working factories at much less cost than before, as whatever may be the drawbacks of liquid fuel it really supplied a distinct advantage in cost of working and labour. Our representative, from another source learnt that engines worked with liquid fuel would want a deal of looking after and cleaning as the oil itself was dirty. The oil, it is said, is a refuse oil, and is distilled from the ground in a crude state. It is in fact an oil from which petrol, kerosine and more volatile oils had been extracted, but what it is going to do for estates remains yet to be seen, and the venture of Messrs. Delmege Forsyth & Co. to

ERECT A STORE AT TALAWAKELE TO STORE IT,

in view of their opinion, that it will be extensively used before long, and Mr A Hamilton Harding, the Honorary Secretary of the Dimbula Planters' Association, expressing it as it been generally understood that its demand would in the near future increase rather than decrease, speaks for itself. In Colombo we would add that the cost of petroleum now so largely used in factory engines upcountry is approximately 48 cents. per gallon, while the liquid fuel is obtainable at 12 cents. per gallon. Whether the prices will in time fluctuate remains to be seen, as the lesser demand for petroleum may bring its price down ; while the increased demand for liquid fuel should have a tendency to raise its price rather lower its present rate even though facilities for importing liquid fuel in bulk be arranged for, as has been suggested.

THE FAUNA OF BRITISH INDIA.

We have to acknowledge receipt from the publishers of a copy of the latest volume of the above work, which includes the Fauna of Ceylon and Burma ; and is published under the authority of the Secretary of State for India in Council. Edited by W T Blanford. The present volume is on Rhynchota.—Vol. I. (Heteroptera) by W L Distant. The publishers are in London : Taylor and Francis, Red Lion Court, Fleet Street. Calcutta: Thacker, Spink and Co. Bombay: Thacker and Co.,Limited. Berlin: B Friedländer and Sohn, 11, Carlstrasse, 1902. The whole series is a most valuable one and in the preface to the present volume Mr Blanford states :—

Other volumes on Indian Invertebrata are in preparation, and two are so far advanced that their

early publication may be expected. These two are a volume on Ants by Colonel C T Bingham, and another on Longicorn Coleoptera by Mr C J Gahan. A volume of Land-Mollusca is also in hand, and arrangements are being made for further additions to the general series.

CINCHONA IN BENGAL.

According to the annual report by Major Prain, Superintendent of Cinchona Cultivation in Bengal, 13,434 lb. of cinchona febrifuge were manufactured last year at the Government Cinchona plantation in Sikkim, an increase, as compared with the previous year, of 3,599 lb. This increased quantity included 2,663 Cinch sulphate, of quinine, and 936 lb. of cinchona febrifuge. The receipts for the year amounted to R1,91,922 as compared with R2,27,087 for the preceding year. —*Madras Mail*, Sept. 27.

"ON THE ORIGIN OF PEARLS."

Dr. H. Lyster Jameson, M.A., is good enough to send us a copy of his paper on this subject reproduced from the proceedings of the Zoological Society of London. It is accompanied by four full pages of illustrations and a list of literature on the subject. Dr. Jameson controverts the theory that the pearl is due to the intrusion of an irritating body (a grain of sand, &c.,) which the oyster proceeds to coat with carbonate of lime, so elaborating the pearl. His investigations go to show that the intrusion is rather by a living parasite, a "trematode." Trematode larvæ cause sacs to develope and these lead to pearl formation; but one must read the paper very carefully, to appreciate the full importance of the investigation carried on by the author and scientist. The paper should be of great use to Professor Herdman and Mr. James Hornell.

RICE IN INDIA AND AMERICA.

We remember reading a short time ago a learned discussion, as to whether India is the poorer for the growing volume of her exports; and the issue specially turned on whether the rice which was exported from the country was surplus stock, in excess of its needs, or whether it represented the food of the people which they were too poor to purchase, and for the lack of which they died in thousands and, in bad years, in millions. In recent years at least—whatever may have been the case a century back, India is believed to have always had rice enough for the needs of all her population; and the reason why famines that is scarcity in particular tracts, proved disastrous was mainly, if not solely, through the difficulty of transporting food whither it was most needed. We are by no means sure that India would be any the richer for the non-exportation of rice; but if the successful growth of rice in particular States in America has not been exaggerated, as has been the cultivation of tea, India will cease to be regarded in the markets of the world, at any rate in those at a distance, as a necessary source of supply. When that happens, may we expect Indian famines to cease to decimate the population, or will the growth of more remunerative crops take the place of rice? We quote as follows from an Indian paper, as a new proof of the almightiness of Yankeedom:—

"Writing of the growth of rice cultivation in Louisiana, the *Louisiana Planter* says: Hundreds of thousands of acres of land are being prepared for rice culture, and unless some adverse conditions intervene, our rice crop should be doubled, or tripled, within the next ten years. The prairies of South-western Louisiana have produced rice in small quantities for a century; but it has only been of late years that active efforts have been made there in the direction of the artificial irrigation of rice. In Louisiana and Eastern Texas there were produced last year some 3½ million bags of rice, equal to about 175,000 short tons of clean rice. This large production has been nearly all marketed, and the advent of the new rice crop on September 1st will find but little of the old crop remaining on hand, the distribution of the last crop, the largest ever produced, having been successfully made and at good prices. All this is leading to new efforts in every direction for the enlargement of the industry, and one of the most notable of these schemes is that of the Bradford Canal, which will be about 75 miles long and 250 feet wide, and will afford ample irrigation for from 500,000 to 700,000 acres of land through the district which it will traverse."

CEYLON PYTHONS GALORE.

With reference to the statement of a Galle correspondent that a python 10½ feet long was killed near that town while attacking a goat, a Kadugannawa planter writes:—

"It may interest you to hear that three pythons were killed in the tea on this estate during 1901: the largest measured 11ft. 6 in. by 18 inches in girth and the other two about 10ft. 6in. and 10 feet respectively."

Tennent's reference in his "Natural History" is as follows:—

The great python (the "boa," as it is commonly designated by Europeans, the "anaconda" of Eastern story), which is supposed to crush the bones of an elephant, and to swallow the tiger, is found, though not of such portentous dimensions, in the cinnamon gardens within a mile of the fort of Colombo,* where it feeds on hog deer, and other smaller animals. The natives occasionally take it alive, and securing it to a pole expose it for sale as a curiosity. One that was brought to me tied in this way measured seventeen feet with a proportionate thickness: but one more fully grown which crossed my path on a coffee estate on the Peacock Mountain at Pusilawa, considerably exceeded these dimensions. Another which I watched in the garden at Elie House, near Colombo, surprised me by the ease with which it erected itself almost perpendicularly in order to scale a wall upwards of ten feet high. The Singhalese assert that when it has swallowed a deer, or any animal of similarly inconvenient bulk, the python draws itself through the narrow aperture between two trees, in order to crush the bones and assist in the process of deglutition.

* [That was 40 to 50 years ago when jackals prowled nightly along Turret Road!—Ed, *T.A.*]

COOLY TIN TICKETS.

[The following correspondence has been sent us for publication.—Ed. *T.A.*]

My dear T.—The enclosed remarks, with reference to tin tickets, writen by the G.A., Western Province, may be of interest to you:—

"The objections that are raised in some quarters to tin tickets being required at all times in order to secure cooly rates appear to me somewhat unreasonable. I do not think it can be disputed that the certificate system at present in force is greatly abused, and that a number of persons travel under the certificate at cooly rates who are not *bona fide* coolies. I do not mean to suggest that planters wilfully grant certificates to persons who are not entitled to them; but I think that it is not an uncommon practice to give a certificate to a kangany without knowing who will travel by it. The restriction of cooly rates to gangs of six and upwards has probably greatly contributed to this abuse of the system. If tin tickets are, as is proposed, accepted as proof of the status of an estate labourer, such restriction will no longer be necessary. A single cooly may travel at cooly rates on production of his tin ticket and certificate. As regards the legal point, *the ordinance specifies no form of certificate*, nor is the Railway authority required to accept such certificate if he has any doubt as to the status of any alleged cooly labourer. It may be said that tin tickets may be in the same way misused by kanganies, but the new form of certificate renders this unlikely, and it is hoped that no planter will issue a tin ticket to a person who is not a *bona fide* cooly The new form of certificate entails a a little additional trouble, but on the other hand, combined with the tin ticket system, it renders desertion and crimping far more difficult and easier of detection. Undoubtedly employers of labour who are ready to take any coolies they can get without asking questions will oppose the system in its entirety, but I hope that in a short time the number of unregistered estates will be very small and that the transfer of coolies between estates will be greatly simplified by the adoption of the tin ticket system."

The tickets are R2·50 a hundred.—Yours sincerely, A. C. Kingsford.

Rookwood, Hewaheta, 26th Sept. 1902.

Sir,—With reference to your letter of the 22nd July, 1902, I am directed to inform you that the restriction imposed by the Government Agent, Western Province, was imposed by him not as Government Agent, but as the originator of the tin ticket scheme and to state that the question of the restriction is under consideration and awaits the receipt of a further communication from the Planters' Association of Ceylon.—I am, &c.,

(Signed) A. G Clayton,
for Colonial Secretary.

Colonial Secretary's Office, Colombo, 29th Sept. 1902.

TEA IN JAVA.

Mr. L. A. Wright, of Maskeliya, who has just returned from Java—where he and other members of his family own property in tea, cinchona and coffee—has a favourable account to give of tea, notwithstanding the low prices. The rich Java soil gives a better yield per acre by, perhaps, 25 per cent than Ceylon; the labour is cheap and reliable, and planters are taking to all the modern improved machinery. He also mentioned to a representative of our contemporary that the telephone is in universal use, nearly all estates and bungalows being connected.

PLANTING NOTES.

The Deane-Judge Strainer—so successfully tried in Calcutta the other day, is to be still further improved by the principal parts being made in steel in England. Meantime there is another "Richmond in the field" in Calcutta—a Ceylon-made Machine of which four have been already ordered, and a trial of which may be reported any day now.

The Cholera Microbe in Well Water.—The Madras Government has approved of the suggestion of the Sanitary Commissioner (Madras) that District Medical and Sanitary Officers be requested to send to him specimens of well or other water believed to be contaminated with the cholera microbe before they add permanganate of potash, and another specimen twelve hours after having done so. The purpose of the investigation is to ascertain what is the actual result of using permanganate of potash under the methods at present pursued.—*Pioneer*, Oct. 10.

Bamboo for Pulp.—The Collector of Customs at Trinidad reports that enquiries have been made of the Government of Trinidad respecting the possibility of obtaining bamboo in quantities large enough to warrant the establishment of a factory in the Colony for the production of pulp. At present immense areas in Trinidad are occupied by the bamboo, and these could be almost indefinitely increased if the plant were in demand. There is no doubt whatever that if a factory were established in our near Port of Spain a practically unlimited supply could be obtained within a radius of five or six miles—*Board of Trade Journal* for September.

A Dry Cycle.—All over the world there has been scarcity of rainfall and the Nile is expected to be lower than within living memory: but fortunately the Assiout Barrage was closed early, is expected to save the agriculturists of Upper Egypt. According to one of the London correspondents in Cairo Egypt will be repaid the cost of the Assiout Barrage in the first year of its existence—a marvellous testimony to the value of Government enterprise and of wise expenditure on reproductive works. From the London *Speaker* we quote:—"It is perhaps not too much to say thatthroughout the world the rainfall during the last five years has been below the average. In many of the southern districts of England, for example, old springs have dried up, and it has been necessary to sink wells deeper. In India, as everyone knows, the famines have been abnormal, and Australia has suffered terribly from drought. It is to be feared that the rains reported during the last few weeks in Australia are partial, and in many districts insufficient to restore prosperity; but happily the danger of any renewal of the famine in the Bombay Presidency of India has been altogether dispelled,

TO THE PLANTING WORLD.

Seeds & Plants of Commercial Products.

Hevea Brasiliensis.—Orders being booked for the coming crop August-September delivery 1902, booking necessary before the end of April, quantities of 100,000 and over at special low rates. Plants available all the year round, 100,000 and over at special low rates. A leading Rubber planter in Sumatra, who purchased 50,000 seeds in 1899, and 100,000 in 1900, writes us, under date 15th November, 1900:—"I received your letter of 20th October, from which I learn that you added another case of 5,000 seeds to replace the loss, &c. I am satisfied hereby, and even after this adding I am satisfied by the whole delivery of this year." Special offer, post free on application.

Castilloa Elastica.—True superior variety cultivated in Mexico, seeds from specially reserved old untapped trees. Orders booked for August-September delivery 1902, immediate booking necessary; large quantities on special terms; Plants in Wardian cases.

A foreign firm of Planters writes under date 11th October, 1901:—"We beg to enquire whether you would procure us 100,000 Castilloa seeds, in which month we might expect them, and what would be the average price." Special offer, post free on application.

Manihot Glaziovii.—Seeds and Plants available all the year round, 100,000 and over at special low rates. A Mexican planter in sending an order for this seed wrote on the 22nd August, 1900:—"If they arrive fresh and germinate easily I may send you larger orders, as they are for high ground where the Castilloa does not thrive."

Ficus Elastica.—Seeds available in May-June; booking necessary before the end of March; also plants.

Mimusops Globosa (Balata) wood of the tree is much sought for buildings, fruits sweet like a plum and eaten, oil from seeds, said to yield as much as 45 lbs. of dry rubber per tree per annum, the milk is drunk and when diluted with water used as cow's milk, grow from-sea-level up to 2,000 feet, orders being booked for seeds and plants, price on application.

Cinnamomum Zeylanicum (Cinnamon superior variety).—New crop of seed in April to June; booking necessary before the end of February, also plants.

Coffee Arabica, Liberian Hybrid and **Maragogopie Hybrid.**—New crop March-April; immediate booking necessary.

A foreign Agricultural Department writes dating 9th September, 1901:—"Please accept our order for 175 lbs. of Tea seed and for 2,000 Coffee beans. In regard to Coffee seed I would say that this will be the first importation made by this department, and we will leave the selection of the varieties to be sent to your judgment."

OUR DESCRIPTIVE PRICE LISTS.

The following six Descriptive Price Lists are now being forwarded with Circulars and special offer of Seeds and Plants of Rubber and other Economic Products:—

1. Tropical Seeds and Plants of Commercial Products, enlarged edition for 1902.
2. Seeds and Plants of Shade, Timber, Wind-Belts, Fuel and Ornamental Trees, Trees for Road-sides, Parks, Open Spaces, Pasture Lands, Avenues, Hedges, and for planting among crops (Tea, Coffee, Cacao, Cardamoms, &c.)
3. Seeds and Plants of Tropical Fruit Trees including Mango grafts.
4. Bulbs, Tubers and Yams.
5. Orchids—Ceylon and Indian.
6. Seeds and Plants of Palms, Calamus, Pandanus, Cycads, Tree and other Ferns, Crotons, Roses, Dracinas, Shrubs and Creepers.

Special Arrangements made with foreign Governments, Botanical and Agricultural Departments, Planters and others for supplying seeds and plants of Commercial Products in large quantities.

"South Africa."—The great authority on South African affairs of 25th March, 1899, says:—"An interesting Catalogue reaches us from the East. It is issued by William Brothers, Tropical Seed Merchants of Henaratgoda, Ceylon, and schedules all the useful and beautiful plants which will thrive in tropical and semi-tropical regions. We fancy Messrs. Williams should do good business, for now that the great Powers have grabbed all the waste places of the earth, they must turn to and prove that they were worth the grabbing. We recommend the great Powers and Concessionaries under them to go to William Brothers."

Agents in London:—Messrs. P. W. WOOLLEY & Co., 90, Lower Thames Street.

Agent in Colombo, Ceylon:—E. B. CREASY, Esq.

Agent in British Central Africa:—T. H. LLOYD, Esq., Blantyre.

Telegraphic Address: J. P. WILLIAM & BROTHERS,

William, Henaratgoda, Ceylon. *Tropical Seed Merchants*,

Liber's, A.I. and A.B.C. Cd es used. Henaratgoda, Ceylon.

ARTIFICIAL MANURING FOR TEA.

[Paper read, September 29th by Chairman Dimbula P.A. at General Meeting.]

It may be within the recollection of some of you that 15 or 16 years ago, I published the result of a series of manuring experiments on coffee as carried out on Yoxford estate. With the advent of green bug, coffee was wiped out and those experiments came to an end. Eight years ago I was able to commence a series of experiments on tea which have been in progress since, and which have given me some insight into the principles which should guide us in dealing with tea. This is my justification for addressing you to-day on the subject of manuring tea, which is I judge of interest to most of you, though probably some already know as much as I do myself and perhaps more. I must commence by making the admission that I cannot give accurate scientific proofs of all my deductions. With coffee it was a comparatively simple matter as the object was solely to find out how to produce the largest crop with the least injury to the tree, whereas with tea it is, at least, as important to find out how far the quality is affected by the manure. On this latter point I have only been able to draw my conclusions from my general experience. Mr Alleyn says, I understand, that he has been able to get to the bottom of the subject and has patented his information, which you will be able to buy from him shortly. He has been more fortunate than myself in being able to expend money on a large scale which is necessary for discovering how quality is best maintained or increased, along with the increase of leaf. We see frequent references to manuring in the papers. Many seem to think that all manures should be suppressed by legislation as tending to over-production which is not only impracticable, but shows how little the true principles of manuring have been grasped. It is quite impossible to distinguish between manures which are sustaining and manures which are forcing, the difference is one of degree and not of kind. There are two systems of manuring in vogue: the one is mainly *sustaining* the object being to restore the natural fertility of the soil; the other is *forcing*, in that it tends to raise the production of an estate beyond what would have been its normal yield under the most favourable conditions. I regret to see the latter system has found its way into Dimbula, because this district has undoubtedly a flavor and quality which I would wish to see it maintain and which, I believe, will be lost by the adoption of the forcing system. I believe it is quite possible to manure in such a way as to keep the tea at a normal level of production combined with good quality and that it will pay better in the long run to work on this system. Such at any rate are the conclusions I have arrived at after ten years' of experience of manuring tea and eight years of careful experiment. My first experiments were conducted with the object of finding out the most important element required in a manure for tea and were so arranged as to compare the results of adjoining plots of the size of one-sixth of an acre, by leaving out one element in each plot on the plan of M Ville. The important elements removed from the soil by the tea crop are nitrogen, phosphoric acid and potash, 1,000 lb. of tea removing 45 lb. of nitrogen, 8 lb. of phosphoric acid, and 22 lb. of potash. My plots were laid out, therefore, as follows:—

No. 1 in manure; No. 2 nitrogen alone; No. 3 phosphate and potash; No. 4 nitrogen, phosphate and potash; No. 5 nitrogen and phosphate; No. 6 nitrogen in excess, phosphate and potash.

I was very soon convinced that the dominating element was nitrogen. That is to say that without nitrogen phospheric acid and potash were almost inert. That for the best effect all 3 elements were required and more especially potash. That additional nitrogen meant an increased yield, but did not invariably pay owing to the great cost of nitrogen. My further experiments have been directed more to finding out the most profitable mixture to supply and have not been carried very far as yet. The great cost involved has prevented my experimenting in the direction of finding out the effect of different manures upon quality and I have to fall back upon general conclusions from the observations of manuring on estates under my own direction and that of others. My conclusions may not be considered at all convincing, but I give you them for what they are worth. The sources of *nitrogen* best known to us are sulphate of ammonia, nitrate of potash, castor cake, blood meal and fish manure of *phospheric acid,* bones ground or steamed, basic slag and fish manure (super-phosphates are seldom used) of *potash.* Nitrate and sulphate of potash and kainit which contains about 25 per cent of sulphate of potash. I have used my combinations of these manures, but for figures as to results I would commend to your notice Mr Joseph Fraser's published experiments which are by far the most complete of any I have heard of. As regards their effect upon quality I give the preference to castor cake or a mixture of castor cake and blood meal as the source of nitrogen, for the reason as it seems to me that the effect is lasting and not too forcing; blood meal alone is too forcing and quickly used up. Sulphate of ammonia has invariably appeared to me to be accompanied by a loss of quality, whether used by itself or in combination, though it may be only a coincidence. Fish manure I have only used once, and I confess that I have a dislike to it as being too stimulating in its effect and its use has seemed to me usually accompanied by a loss of quality. I imagine that its nitrogen comes into action more speedily than its phosphoric acid, though it is very rich in both elements. Nitrate of potash is, I think, useful as a source of nitrogen and potash, the nitrogen coming into action very quickly but being speedily washed out in wet weather. Basic slag I look upon as a very valuable source of phosphoric acid and I am inclined to endorse Messrs Freudenberg and Co's. statement that it tends to maintain quality in the tea owing to the two oxides of iron which it contains. Bones either steamed or ground should, I think, form part of every manure mixture as the phosphoric acid contained in them comes into action gradually and is not too speedily used up. I give the preference to sulphate of potash as the source of potash as being retained in the soil better than the nitrate. Potash, I consider, is a most important constituent in a manure if quality is to be maintained. Potash is known to have great effect upon the carbo-hydrates of plants, that is to say upon their main structure and ever since the time when I commenced my coffee experiments I have noticed that potash improved the health of the trees to which it was applied. I

believe it is of great value in helping them to resist diseases of a fungoid nature. The manure, which is most commonly used by those who are not well up in manuring, is castor cake and bones, which is an incomplete manure as containing a negligable quantity of potash. A well-balanced manure such as your Agricultural Chemist supplies you with, has its constituents so arranged that each element comes into action gradually and simultaneously and the more this point has been considered the greater the value of the manure in tea cultivation. And ill-balanced manure will stimulate the bush at first and then leave it in-sufficiently supplied with nourishment and a ready prey for diesase. You want to manure your tea, say, every three years, therefore, the manure must last for three years in its effect. The difference between a forcing and a sustaining manure lies in the amount of nitrogen contained in it, and the form in which it is supplied. Take the typical forcing manure now so generally used :—

Castor Cake	400 lbs.	per acre
Fish	400 ,,	
Nitrate of Potash	100 ,,	
Sulphate of Ammonia	100 ,,	

and compare it with the manure generally supplied by the Agricultural Chemists. The mixture I have quoted contains 82 lbs of Nitrogen as against about 25—30 lbs in most of the manures supplied by Messrs Freudenberg and Co., Baur and Hughes. As to the effect of forcing manures which, of course, form part of a regular system of working for large yield, such as low pruning, &c. You are all capable of estimating the effect just as well as I am. The great increase in crop is undoubted and the great falling-off in prices equally evident. I have for instance in my eye an estate in my own neighbourhood where the normal yield would be about 550 lbs per acre and which has been worked up to about 850 lbs per acre, the prices for the teas at the same time having dropped about 3d per lb.

That it is quite possible to manure and yet maintain quality I am well assured. Over the only field which I have manured twice on Holmwood for instance, I have been able to detect a distinct improvement in the cup. The manure applied was low in Nitrogen and rich in Potash and phosphoric acid, Basic slag providing part of the Phosphoric acid. On another estate, which I visit where Mr Bamber's mixture on espcial analysis was applied, the Superintendent reports that the quality is returning as the result of the manuring and higher pruning and the prices bear out his statement. At any rate I would ask you before you commit your estates to the system of working for large quantity to weigh well the evidence for and against. In my strong objection to forcing manures, I am, at any rate in good company; for you have only to read Mr Bamber's report on tea soils to see that he condemns them. From what I hear I am inclined to think that our leading authority on manuring is of much the same opinion also. Before concluding I would like to touch upon the subject of green manuring as I think it promises to economise greatly the future manuring of tea. As you know there are certain plants and trees which have the property of collecting the nitrogen of the air and storing it in their roots to be given up afterwards to the soil such as the Leguminosa the Peas, Beans, Lupins &c., and among our best-known trees the Albizzias, Dadap and so on, Mr Bamber recommends the trial of *Crotolaria striata* which has been used to some extent, I believe, on a Matale estate though with what result I cannot say. It is very evident however that if all the necessary nitrogen can be supplied by the atmosphere by means of green manuring, half the expense would be saved as only the Phosphoric acid and Potash would have to be supplied to the soil. I have tried a small experiment myself with gram on Holmwood which made a profit of R15 per acre ; but when I tried the same on Ancoombra in Matale the growth of the gram was a failure, owing no doubt to the soil having been previously exhausted of its Potash and Phosphoric acid by the heavy crops of coffee which had been taken off that land. To get the full benefit of green manuring Phosphoric acid and Potash should be supplied to the soil before the Leguminous plant is sown. In the low-country I have noticed that Albizzias improved the tea under them in a most marked degree.

I hope I have not wearied you with my address. It is not scientific and is open to any amount of criticism and is only to be taken as presenting some of the conclusions drawn from practical experience by one who has always taken an interest in Manuring problems and who has the interests of this District more especially at heart.

The address was received with rounds of applause and Mr Wilson Smith proposed that a vote of thanks be recorded to the Chairman for hi interesting discourse on Manuring. Mr. G D Jamieson seconded. W. D. BOSANQUET.

TEA MARKETS IN SOUTH INDIA.

A CENTRAL TRAVANCORE SCHEME.

An extraordinary General Meeting of the Central Travancore Planters Association, called for the purpose of discussing the "Tea Exploitation Scheme for S India," was held at Pambanar Bungalow on the 20th September.

Mr H M KNIGHT was after some preliminary business was transacted asked by the Chairman to explain the above scheme. He began by reading the scheme, and explained the paras, not clearly understood by this and other Associations.

The maximum price of 4 annas per lb., he said, did not mean that this was the maximum price at which the teas were to be sold, but the maximum price to be returned to the contributors before any remuneration accrues to the exploiters. The remuneration to exploiters is contingent upon the account sales showing a better nett result than 4 annas per lb., after returning which, the exploiters and contributors divide the balance. For instance, if a lb. of tea, after being suitably packed, is sold for 8 annas per lb. the account would be as follows :—

Dr.	As.
To paid Contributor	4
To expenses (say)	2
Balance to be equally divided between contributor and exploiter ...	2
	—
Total As.	8
Cr.	**As.**
By sale of 1 lb. Packet Tea ..	8

The nett result therefore to the contributor would be 5 annas per lb. if sold at 8 annas. He then went on to say that he thought it absolutely necessary to pack the teas in lead. He produced a

sample of Tea packed in foil paper which had been kept for one month and the tea had deteriorated. He therefore proposed that we would go to the expense of using lead, and thought a Drier, for use in packing, essential to success and suggested that a Drier should at once be purchased for this purpose. Mr Knight read letters from men in South Travancore who approve of the scheme and are willing to subscribe to a Fund which he thought should be raised for the purchase of a Sirocco, and other incidental expenses necessary for the starting of the scheme, also a letter from the Honorary Secretary of the Wynaad Planters' Association asking for information. An attractive wrapper he thought was necessary. He also stated that 100 chests of tea of 90lb. each were now on their way to Madras, Messrs. Parry and Co., having written that they were quite ready to commence operations. This quantity had been readily contributed in the District. After some considerable discussion in Committee, the Chairman put the following Resolutions in open Meeting, which were unanimously adopted :—

1. That members of this Association do agree to contribute at the rate of 3 annas per acre (cultivated) to the "South Indian Tea Exploitation Scheme,' and that growers not being members be invited to subscribe to the Fund so raised and participate in the benefits,

2. That this Association do instruct Mr Knight to purchase a No. 1 Sirocco for the proper working of the scheme.

3. That this Association do consider that the design for wrapper should be left to the Committee, and would suggest that a Brahmany Bull should be on one side and instructions for making Tea on the reverse in the Vernacular.

4. That the Honorary Secretary do write to the U.P.A.S.I., urging the necessity for expediting Election of Committee.

Resolved that a vote of thanks be tendered to Messrs Parry and Co.

With a vote of thanks to the Chair the Meeting ended.—*M. Mail*, Sept. 29.

CASTILLOA RUBBER SEED AND ITS VITALITY.

The period during which the seeds of various economic plants retain their vitality is being investigated at the Royal Botanic Gardens, Peradeniya; but the following figures, supplied to us by Mr. Carruthers, may be of interest to any who may wish to send the seeds of Castilloa to a distant place.

2,000 seeds were sent off from Paris to Peradeniya, packed in leaf mould in four small tin-boxes, each containing 500 seeds. Upon being opened at Peradeniya on September 26th, six weeks after packing, the seeds were found to be as follows :—

	Box 1.	2.	3.	4.	Total.
Fully germinated...	96	128	67	96	387
Split and beginning to germinate ...	30	55	20	63	168
Good hard seeds unsplit... ...	14	12	68	75	169
Bad seed—destroyed by bacteria, etc...	350	300	338	260	1,248

This gives a percentage of 37 good seeds (20 per cent fully germinated, 8 per cent starting germination and 9 per cent good seeds unsplit), and 63 per cent destroyed by bacteria or otherwise killed. The packing in leaf mould which usually contains numerous bacteria, fungi and insects, is not to be recommended. Probably if sterilised sand had been used, the proportion of good hard seeds would have been very much greater.

This seed is an especially unsuitable one for travelling, as it possesses no protective coat which prevents the inroads of insects or bacteria.

The short time that various economic seeds are credited with retaining their germinating power is, undoubtedly, in many cases, due to the fact that no special precautions are taken to prevent the attack of insects, fungi and bacteria, which find a congenial home in nearly all seeds. Most of the seeds, which do not grow, are found by their appearance and odour to have lost their vitality by the presence of foreign organisms. When the experiments, with regard to the seeds of Para rubber, tea and other Ceylon economic plants, have been concluded, the matter will be dealt with in one of the Circulars of the Royal Botanic Gardens.

TROUT OVA FROM NEW ZEALAND.

5,000 RAINBOW TROUT OVA FOR THE C.F.C.

The Ceylon Fishing Club has previously tried, by way of experiment, the importation of trout ova for the Nuwara Eliya and other upcountry streams from New Zealand Hatcheries and the fact that another large batch of ova has just been imported appears to speak well for the first trial. Mr. H D Elhart, Curator of the Nuwara Eliya Hatchery, of the C.F.C., was down in Colombo last month to receive a consignment of 5,000 ova of the rainbow species which was brought out from New Zealand by the P. O. steamer "Oroya." The ova, so far as can be ascertained, has been well packed and has received good attention from those in charge of the consignment on board the steamers, but it still remains to be seen how they will hatch out at Nuwara Eliya. We heard recently that the stew-ponds at the Sanitarium were cleared out and the fry put out into the streams, so that the arrival of the present batch has been well provided for. With the interesting correspondence from local anglers which we have lately had showing that the "rainbow" is taking kindly to our streams and showing its appreciation of our streams by spawning freely. We are, perhaps, not far from the time when importation will cease—an event which will reflect much credit on the zealous efforts of the Ceylon Fishing Club.

HIGHLAND TEA CO., LTD.—It is satisfactory to learn that this Company has paid an interim dividend of two per cent. the same as they did in 1901, the full dividend for that year being four per cent.

COCONUT CULTIVATION IN THE STRAITS.

To the Editor of the "Straits Times."

DEAR SIR,—Your issue of 12th instant has just reached me, and therein I notice a letter on the above subject from the pen of Mr. W. Greig, of Kuala Langat. As I happen to be Mr. Greig's visiting agent, as well as at the same time, Chairman of the United Planters Association, I trust that I may be allowed to make a few remarks bearing upon the existence of the coconut beetle in the Federated Malay States as adversely affecting investment in this particular cultivation. Perak and Negri Sembilan it is well known suffer but little in comparison with Selangor, and visitors from these States have over and over again, especially of recent years, expressed their astonishment at the terrible havoc wrought by "beetle" upon the coconuts in the immediate neighbourhood of Kuala Lumpur. Many Ceylon men, whose names are as well known to Mr. Greig as they are to me, have visited estates where coconuts have been planted, have gone carefully into the expenditure connected with the destruction of the beetles, and have advised their friends that until the pest has been brought within proper control, the cultivation of coconuts must be attended within considerable risk. The Selangor Government were prepared to give me a very large concession of excellent land, on as easy terms as even I could wish, with the object of opening a large area in coconuts, but the fear of "beetle" blocked the way, and the necessary capital was not forthcoming. Mr. Thomas North Christie, a man whose judgment Ceylon planters have, for many years now, regarded as well nigh infallible, recently recommended that one of the finest clearings of 2-3 years' old coconuts in Selangor should be at once interplanted with rubber. I admit that our alluvial soil has had something to do with these adverse criticisms, and that the presence of more or less stiff clay comparatively close to the surface is not regarded with favour by our Ceylon visitors, but I know that the ravages of the beetle are considered to be of much greater significance. In face of the foregoing is it surprising that the Annual Report of the United Planters Association should state "that owing to the ravages of beetle, and the cost of keeping the trees clean, coconuts are not as much planted as their fine growth would lead one to suppose that they would be. . . . . Your Committee are of opinion that the cultivation will always be a remunerative one as long as it remains possible to keep the beetles under, without incurring a prohibitive expenditure in doing so." Mr Greig prides himself on being unable to record the loss of a single tree from beetle. I may as well explain that it is the duty of managers of estates in beetle-infested districts to see that each coconut tree is examined at least once in every three days and every day if the insects are present in great numbers. According to Mr Ridley, there are two species of beetle which attack coconut trees, *Rhynchophorus Ferruginent*, the Red Beetle, and *Oryctes Rhinoceros* or the Rhinoceros beetle. The former, which is by far the most dangerous is, as far I am aware, very rarely met with in Selangor. According to the same authority the adult insect of this variety with its long ovipositor pushes its eggs "as deeply into the body of the tree as it can." "It is here not to the perfect insect but the grub that does the injuries" borrowing "tunnels through the soft growing portion of the palm." The Rhinoceros beetle, on the other hand, never deposits its eggs in coconut palms, unless the trees are "decaying" or in other words, dying if not dead. But the insect "makes its way to the base of a leaf stalk and burrows into the heart of the cabbage, making a large hole." From these quotations it is clear that whilst the red beetle, despite the most careful attention on the part of the management, may do an infinity of damage "it being by no means easy to find out when a palm is attacked by this insect," regular inspection of trees, if properly carried out, renders it practically impossible for the Rhinoceros beetle to do any very great permanent harm. It seems to me therefore that, given labour and the funds necessary to permit a regular examination of his trees, no planter should lose a single specimen from the attacks of the Rhinoceros beetle. To quote Mr Ridley again "it would be easy enough in a clean-kept estate to keep down the beetles, but where there is an endless supply of them in an adjoining estate, the matter is of great difficulty" which means I take it, that under such conditions, the expenditure of large sums of money has to be incurred. It is not my purpose in writing this letter to attempt to throw cold water upon the cultivation of coconuts, or to suggest that as the rotting timber on new clearings disappears the pest in that particular locality will not grow eggs, for I firmly believe myself that there is a lot of money in the industry, and that on no estates, properly managed by Europeans, has the expenditure upon beetles been found to be prohibitive. But I do say that when thousands of coconut palms have been killed and rendered unproductive through the almost criminal negligence of their native owners in not keeping them clear of beetles, it is high time that the Planters' Association drew attention to the fact and recorded that investors are, as a consequence, shy of giving the cultivation of coconuts the support that their fine growth would seem otherwise to warrant, and I am altogether at issue with Mr. Greig, whose figures are in my hands, and others, who state the cost of keeping beetles under "is merely nominal considering the total acreage under cultivation." It is *essential* that the trees in all infected areas should be regularly examined at very short intervals, whether the beetles are there or not, and when it is considered what climbing and looking over a coconut palm means, it is the sheerest nonsense for any one to try and make out that the expense is "merely nominal." The evil is a very real one indeed, and it is now for the Government without any further loss of time, to see that the remedy, on the lines of Mr. Ridley's excellent memorandum, is vigorously applied.—I am, dear sir, yours faithfully, E. V. CAREY.

—*Straits Times*, Sept. 22. Klang, 15th Sept.

THE UNITED STATES TOBACCO INDUSTRY.

The total quantity of leaf tobacco produced :—

1890	... ...	488,256,646 lb.
1900	... ...	868,163,275 ,,

The total production of the United States in 1900 shows an increase of 379,906,629 lb, or 77·8 per cent over the crop of 1890. All the states and territories were represented except Colorado, District of Columbia, Nevada, Rhode Island, and Utah, but the cultivation of tobacco on a large scale was confined to comparatively few states. The crop of only eighteen states exceeded 1,000,000 lb each and that of thirteen states 5,000,000 lb each. Eight states produced more than 20,000,000 and three states more than 100,000,000 pounds each. Kentucky, North Carolina, Virginia, Ohio and Tennessee, in the order named, were the five greatest producers, whose combined crop was 679,791,000 lb, or 76·3 per cent of the entire producion. Kentucky alone produced 36·2 per cent of the entire crop of the United States.—*Board of Trade Journal*, Sept. 4.

CEYLON PARA RUBBER.—Mr. R W Harrison reports Culloden Para Rubber at last London sales as averaging 3*s* 8¾*d.*; biscuit selling for 3*s* 10¾*d*, and scrap for 2*s* 5*d*.

NEW TEA COMPANIES.

The following have been registered in England:—

BLIND TEA AGENCY, LTD., (74,781).—Registered Sept. 4th with capital £100, in £1 shares, to acquire the business carried on by F A Woollatt as The Blind Tea Agency, and to carry on the business of planters and growers, importers and blenders of and dealers in tea, coffee, cocoa and other Eastern and Colonial products, etc. No initial public issue. The No. of directors is not to be less than 3 nor more than 6; the first are F A Woollatt, E E Jex and R S Wells. Registered office, 5, Fen Court, Fenchurch St, E. C.

EMPRESS TEA STORES, LTD., (74,803).—Registered Sept. 6th with capital £15,000, in £1, shares (50 def.), to carry the business of wholesale and retail merchants, dealers, importers and manufacturers of tea, coffee and all kinds of foods, drinks, provisions, drugs, chemicals, confectionery, perfumery, soap, furniture, household goods, etc. The subscribers are;

	Shares.
G W Winter, 11 Plympton Avenue, Brondesbury, N W, clerk	1
W L Rowe, 55, Warham Road, Hornsey, N, clerk	1
T C S St. John, 119, Canfield Gardens, N W gent	1
W H Lewis, 711, Underhill Road, Dulwich, S E, clerk	1
C J Chapman, 57, Bramford Road, East Hill, Wandsworth, S W clerk	1
C Jones, 24, Roupell St, clerk	1
E H Hoare, 1, Seymour St. W, gent ..	1

No initial public issue. The number of directors is not to be less than 3 nor more than 5; the first are to be appointed at the first general meeting; qualification £25. Registered by Neve & Co., 21, Lime St, E. C.—*Investors' Guardian*, Sept. 13.

A MOSQUITO EXPELLER.

Mr. William Stiell, representing Messrs. Leyshon and Carroll, of Durban, has been visiting Delagoa Bay, with an ingenious apparatus for driving mosquitoes and microbes of organic matter out of a room. It is in the form of a tin cylinder, with large wick inside. This wick is saturated with ozone, extracted from pine-wood, together with eucalyptus oil and other ingredients, and the fumes arising therefrom drive the obnoxious insects and microbes from any moderately-sized room.—*O Futuro.*

PINEAPPLE AS AN AID TO DIGESTION.

Under this head the *Agricultural News*, which is a Fortnightly Review of the Imperial Department of Agriculture for the West Indies, has a note which has an important bearing on the trade in tinned Pineapples. The flavour of these fruits and their price, as compared with that of the fresh grown fruit have gained for them a very wide reputation, and tinned Pineapples are not despised even on the tables of the upper classes, so that Pineapples in this form have become a very large article of import, both from the West Indies and from the Straits Settlements. The fact of their containing a digestive ferment, to which the *Agricultural News* draws attention, is another and a strong recommendation to their use as a desert fruit. For a long time the Papaw (Carica papaya) has been known to contain a valuable ferment known as papain, used as an aid to digestion, and the *Agricultural News* now refers to the fact bromelin, the ferment of the Pineapple is almost identical in its action with papain. Quoting from the *Lancet*, it is stated that "the partaking of a slice of Pineapple after a meal is quite in accordance with physiological indications.', Bromelin exerts a powerful action on proteids ' digesting 1,000 times its own weight within a few hours. Fibrin disappears entirely, the white of eggs is digested slowly, whilst albumen of meat is transformed first to a pulpy gelatinous mass to be completely dissolved later. Cooking destroys the activity of the ferment, but the *Lancet* is of opinion that unless the Pineapple is preserved by heat, there is no reason why the tinned fruit should not retain its digestive power. On this the *Agricultural News* says—"Unfortunately for this hope, Pineapples are sterilized by steam-heat during the process of canning, the ferment being almost certainly destroyed. Unlike pepsin the digestive principle of the Pineapple will operate in all acid, neutral, or even alkaloid medium, according to the kind of proteid to which it is presented. It may therefore be assumed that the Pineapple enzyme would not only aid the work of digestion in the stomach but would continue that action in the intestinal tract. Pineapple, it may be added, contains much indigestible matter of the nature of woody fibre, but it is quite possible that the decidedly digestive properties of the juice compensates for this fact." With such important properties in the fresh fruit, it seems that there is an opening for some one to try his hand in preparing Pineapples for exportation without the aid of heat.—JOHN R. JACKSON, Claremont, Lympstone, Devon.

RUBBER EXPORT FROM PARA.

A report, dated 7th July last, by the United States Consul at Para states that, according to the final returns, the shipments of rubber from the Amazon Valley this season amounted to 29,997 tons, or 2,317 tons more than in 1900 1901. In the season just begun, it is believed that an exceptionally good crop will be harvested. The rubber fields of the lower river, and especially on the islands, are slowly but surely failing, both in quantity and quality; but the decrease is more than made up by the development of new fields and the expansion of the old fields on the Upper Amazon. While all the more important of the Amazon are supplying their full quota of rubber, and even making a promising increase, interest will be centred in the now famous Acre territory and in South-eastern Ecuador. In the regions reached by the Purus (of which the Acre is a tributary), Jurua, Beni, Madre de Dios, Javari, Ucayali, Japura, and other great affluents of the Upper Amazon, which penetrate Peru, Bolivia and Ecuador, there are illimitable rubber forests as yet unexplored, which will now be gradually developed. Many seringueirous, or rubber gatherers, are making their way to these regions, and it is reported that several syndicaies are about to begin operations in new fields in Bolivia and Peru. Bolivia continues to offer inducements for the colonisation and development of her vast area of rich rubber and mining territory.

The Consul adds that he is informed that the Government of the State of Amazonas has granted the exclusive privilege of receiving, cutting and packing all the rubber produced in that State to one wharf company. The creation of this monopoly will injure the rubber trade of that region, but Peru Bolivia and Ecuador will be the gainers, as rubber growers and gatherers in Para are seeking to escape the new restrictions, which entail considerable expense and trouble upon exporters.—*Board of Trade Journal*, September 4.

MR. ALLEYN'S NEW PATENT.

Among the applications for patents for inventions in India appears the following entry:—John Grieve, Engineer of Hatton, Ceylon and Henry Mathew Alleyn, planter, of Meeria Cotta, Maskeliya, Ceylon improvements in apparatus for grading, sifting, polishing, and increasing the keeping qualities of green or oolong teas, and improvements in apparatus for polishing, grading, sifting, and increasing the keeping qualities of black or fermented teas.—*M. Mail.*

OFFICIAL STATISTICS OF IMPORTS AND EXPORTS OF CRUDE INDIA-RUBBER (IN POUNDS.)

AMERICA BY FAR THE LARGEST IMPORTING AND MANUFACTURING COUNTRY.

		Imports.	Exports.
UNITED STATES.			
Six months	1902	27,142,990	1,852 299
do	'01	31 788,832	1,677,533
do	'00	23,915,95	2,220,904
GREAT BRITAIN.			
do	'02	26,287,968	15,150,688
do	'01	26.976.656	15,482,880
do	'00	33,326,832	16,835,840
GERMANY.			
do	'02	16,475,140	6,280,560
do	'01	14,039.960	3,951,420
do	'00	15,696,340	4,634,960
ITALY.			
do	'02	767.800	75.240
do	'01	794,640	92,840
do	'00	708,620	..
FRANCE.			
do	'02	8,955,320	4,361,280
do	'01	9,056,080	3,530,800
do	'00	10,112,520	4,275,480
AUSTRIA-HUNGARY.			
do	'02	1,408 880	6,820
do	'01	1,132,340	19,360
do	'00	..	..

—*India Rubber World*, Sept. 1.

PLANTING IN NORTH TRAVANCORE.

It is 25 years since Mr. Wm. Hendry, who leaves for "home" by the ss. "Shropshire" on Sunday, first came to Ceylon. But he had a break in that period of 10 years on his farm of Cairnton, near Fordyce, which farm he keeps on, although he has now again been out a good many years as a Manager of tropical estates. Mr. Hendry's latest engagement has been for four years in charge of the Puluvasal division of the Great Kanan Devan Co.'s property in North Travancore, under the chief management of Mr. P. R. Buchanan who is as active as when he was tea planting in Assam many years back. Mr. Hendry has a wonderfully good account to give of the

COFFEE, CARDAMOMS AND CINCHONA.

He himself has had chiefly to do with coffee, and it is quite cheering to learn of the splendid crops—4,000 to 6,000 bushels from less than 200 acres of young coffee. Indeed, the coffee had to be stripped of a great show of berries at two years old and it gave 40 tons the following season while it is due for 60 tons now. There is the inevitable fungus about; but it does not seem to do harm above 4,800 feet. Cardamoms are growing well; but recognising the limited market, energy is now chiefly directed to planting

CINCHONA

of which there will be a magnificent show erelong. As regards tea, hitherto the manufacture has been mainly through one factory; but Mr. Buchanan seems to favour separate factories which will no doubt cause Superintendents to take a greater interest in how their teas turn out. The

WIRE TRAMWAY

continues to work most satisfactorily.

PLANTING IN JAVA AND EXPORTS.

In connection with the emigration of Javanese, referred to in my last letter, the necessity of it is argued from various sides on account of the strong increase of the population. In 1870 the population in Java was 16,000,000 souls, and at present it is 28,000,000, thus showing an increase of 12,000,000 in thirty years. How to find work and food for this great number, which will continue to augment? This is a question earnestly to be considered by all who have the interest of Java at heart. Various means are mentioned, such as improvement of agriculture by irrigation, restraint of the cattle plague, and of disease in the coffee plant, and support of the sugar cultivation, &c., and if more attention had been given to all these means in former years much of the misery from which the population now suffers would probably have been prevented. Fortunately the condition is not gloomy in all districts. In the Preangerlands the condition is improving, and this will also be the case in the east corner; but notwithstanding this, a remedy will have to be found against the overpopulation. For this reason the attention is directed to emigration to the other colonial possessions, and among other places also the Lampong districts in South Sumatra are mentioned, where the soil is excellently fit for the cultivation of coconuts, rice, sago, sugar, cotton and indigo.

Of the comparison of the statement of exports of 1901 with the last twenty years, the result is certainly surprising. The general exports increased from fl.154,000,000 to fl.230,000,000, among which are several articles in which the natives have a direct interest, such as wood, fl.700,000 more; cinchona bark, fl 3,600,000 more; coffee, fl.5,900,0 0 more; petroleum, fl 4,600,000 more; rice, fl2,500,0 0 more; sugar, fl.1,800,000 more; tobacco, fl.15,200,000 more; tea, fl 2,400,000 more. The total is thus fl.36,700,000, of which fl.1,500,000 must be deducted for reduction in value of exported indigo; balance, fl.35,200,000; so that still fl.36,000,000 of the increase of fl.76,000,000 have to be explained. The export of coprah was in 1884, fl.113,831, and at present fl.10.300,000. Sundry kinds of rubber increased by fl.13,300,000, shells by fl.2,600,000, and the balance must be found in various articles.—*L and C Express*, Sept. 12.

VISIT TO A RUBBER, CACAO AND COFFEE PLANTATION IN COLUMBIA, CENTRAL AMERICA.

VARIETY AND YIELD OF CASTILLOA TREES.

Dr. C. O. Weber is contributing to the "India-rubber Trade Journal" an account of his journey, inspection and laboratory work on a large plantation in the isthmus of Columbia which includes some 70,000 rubber trees (Castilloa elastica) some of them 11 to 12 years of age, besides cacao and coffee. Dr. Weber mentions that of the rubber-yielding Castilloa (there are at least four species) the best is the one possessing a whitish bark: it yields plenty of excellent rubber. Another has a black bark with a rough, irregular surface, and this yields a rubber as good as the white bark kind, but the tree is rapidly exhausted. Then again there is a variety with reddish bark very thin and fragile, which yields very little latax, but the rubber produced is of good quality. Still further, there is a variety "Castilloa of Panama" distinguished by the enormous size of its leaves—some of them even on young trees being 20 inches long. Now Dr. Weber found that the trees on the plantation above mentioned have a bark neither yellow nor white, but of a delicate pale pinkish brown, and they are found to produce a good yield of an excellent quality of rubber. Dr. Weber's results from the tapping of the trees on the Columbia plantation are given as follows:—

Age of tree	Yield of latex.	Per cent of rubber in latex.	Yield of rubber.
6	1 lb 13 oz	26	7·5 oz
7	2 lb 5 oz	26	9·6 oz
8	3 lb 1 oz	29	14·2 oz
11	5 lb 3 oz	31	1 lb 9·7 oz

These figures are much better than those obtained by the late Dr. Trimen at Peradeniya, and it is further stated that Dr. Weber considers his figures rather below than above the mark; while as the trees in question can with perfect safety, be tapped twice a year, the annual rubber yield can be taken at double that in the last column as given above. All this may be considered fairly satisfactory to our Castilloa rubber planters—few and far between as we fear they are. To wait 6 and 7 years is a long time; but a crop then of a lb. of rubber per tree, rising year by year until at 11 years over 3 lb. can be harvested, should repay both labour and patience if prices only keep as good as there is every prospect of their doing.

THE CEYLON "HANDBOOK AND DIRECTORY."

(By a Jungle Eremite.)

"Got what agin," growled Bill; "what's the matter now?" "It 's the jumps, Bill," gasped the other, "the 'orrors they 've got me and no mistake!"

This from Anstey's "Vice Versa" almost portrays my state of mind on reading—

"The present is an *ad interim* edition of the 'CEYLON HANDBOOK AND DIRECTORY.'"

I was seriously disturbed about my mental balance. Here I am in the jungle, my nearest neighbour miles away. At last I bethought me of my Chinese krâne. "What are those two words?" I asked. "*Ad interim*, Sir." I drew a long sigh of satisfaction: my nerves were all right after all! Rashly enquiring, he pursued, "Please, Sir, what is an *ad interim*?"

The strain had been severe. Rising on tip-toe and grasping the Great Red Tome firmly in both hands, I brought it down with a mighty crash on to the cranium of the pig tailed one. "*That*," I exclaimed, "*that*, and thou baleful one, *that* is an *ad interim*!" And the wretched Confucian sank into the bowels of the earth.

"Can't you ever be serious?" says the Familiar. (I could write a chapter on Familiars. Socrates, like the writer, must have spent many lonely years in the jungle. This time the invisible one is evidently a female. A male would have said: "Can you *never* be serious?")—"Can't you ever be serious?" Yes, my dear, as serious as a graven image and as dry as a wooden god; which reminds me—Boy, bring light refreshments.

But what I want to know is, if this is an *ad interim*, what is the *final* to be like?

It is impossible to be serious while that impudent little Familiar is raving at me out of Stephens' best blue black. * * * *

I think the compiler is to be congratulated on his dedication: and the illustrious person thus honoured may well count it as another feather in his cap.

The military information, especially the full details of the local Volunteer force on pp. 305, 604 620, 735 and 1,015, is of interest to many who, perhaps, do not often make use of the Directory!

To add more would be to pile Ossa on Pelion (or should it be Pelion on Ossa?). If Mr. Ferguson is to be congratulated on his Directory, much more is the colony to be felicitated on having such a single-hearted public man, such an excellent and painstaking compiler, and such an able and accomplished statistician.—*From Sumatra.*

COCONUT CULTIVATION IN THE STRAITS.—We are aware that a good deal of Ceylon money put into "Coconuts" in the Straits, is considered to be as good as lost, except where rubber has been planted between the palms and is succeeding, so as to become the main staple. Our late friend Mr. A E Wright was very sanguine at first about his young coconut plantation in the peninsula; but his trustees were glad to get out of the place for a small sum comparatively. The explanation of a good deal is found in the correspondence given in the *Straits Times*. On page 341 Mr E V Carey replies to Mr Greig and throws a good deal of light on coconut planters' troubles.

* Up to June, 1902: Colombo, A. M. & J. Ferguson, 1902.

Correspondence.

To the Editor.

AGRICULTURAL INFORMATION: A CORRECTION.

Imperial Agricultural Department for the West Indies, Barbados, 21st August, 1902.

DEAR SIR,—In the *Tropical Agriculturist* for July 1902, p. 11, just to hand, I notice an original article on the "Preparation of Commercial Papain" with wood-cuts is reproduced from the "Agricultural News", the fortnightly review of this Department, without an acknowledgment as to the source whence it was obtained. I am always delighted when information, in respect of tropical products, published by this Department, is reprinted elsewhere; but, in the instance I have referred to, it deals rather hardly upon us as the article is, as far as I am aware, the first which has appeared exactly describing the preparation of papain on a commercial scale based on the experience of many years. I am quite sure it is due to an oversight and that it only requires to be brought under your notice to be put right.*

I am glad to say that the publications of this Department are being largely appreciated in these Colonies. Last year we distributed about 50,000 copies of Bulletins, Pamphlets, and Leaflets amongst all classes of the community.

I heartily congratulate you on the completion of the Twenty-fifth† Volume of the *Tropical Agriculturist*.—Yours truly,

D. MORRIS,

"CEYLON TEA CHESTS AND TEAS FOR THE CANADIAN MARKET."

Foochow, China, Sept. 15.

DEAR SIR,—Our attention has been called to a letter dated Montreal, 12th March last, which appeared in the Correspondence columns of your paper dated the 30th July, in which the writer stated that the interests of the Ceylon Planter are seriously endangered by the use of "pine boxes" whether from China or Japan, and goes on to say that such wood can have no other effect, but to injure the teas packed in it. He also implies that in order to land the teas in good condition it is necessary to pack them in packages made in Japan from Momi wood. The reason for this opinion is not hard to discover when we see that the writer is "A Japanese Tea Importer in Montreal."

We wish to refute the statement that ill-effects to the tea will be brought about owing to the use of "China Pine" boxes. To all those who know tea it is a recognised fact that if there is one tea more than another which is susceptible to damage from smell it is China tea, and yet, in spite of that fact, all these teas have in the past and are now being packed in boxes made from the so-called "China Pine"!!! In addition to this, all the boxes used for the packing of the extremely delicate teas of Formosa are made in this Port of Foochow from the very wood which "Merchant" so censures as a packing material.

As tea box-makers we are fully alive to the fact that wood smelling of resin is not at all suited to the requirements of the tea exporter, but so-called "China Pine" does not smell of resin or anything else, but is a clean wood of attractive appearance and great toughness and, on account of this latter quality, is superior to the Momi.

We maintain and can prove by actual results that the "China Pine" package will land its contents in Montreal or any other place free from taint (due to the box wood used) in better condition than will the Momi package, and that in addition to this the Planter will be able to reduce his expenditure for packing material.

We do not follow "Merchant"'s argument when he says that the writer, (A Japanese Tea Importer in Montreal) should know best what suits the trade!! We think that the latter is prejudiced in favour of the produce of Japan, for reasons best known to himself, and is doing his best to help forward Japanese interests at the expense of the Ceylon planter. We are convinced that if once "China Pine" packages were used by "A Japanese Tea Importer" he would find that his teas were delivered on the consuming market free from all resinous taint and that the packages carried their contents better than any other package yet placed on the market. Asking you to be good enough to insert this reply.—We are, dear sir, yours faithfully,

FOOCHOW SAW MILLS, Co., DODWELL & Co. LTD., *per* E J MOSS, General Manager.

THE FIRST SNIPE OF THE SEASON.

SIR,—Mr. A. W. Gray reported the first snipe of the season on 7th September. I recall one shot at Wilson's Bungalow some years ago on September 1st. Can this be beaten? Please reproduce the following lines to cheer up

SOME OF US.

THE FIRST SNIPE.

Oh say to the sportsman what sound more exciting
In the cool grey of morning, or shadows of eve
Than the chirp of the snipe from the rice swamp, inviting
Pursuit, which it scarcely can wish to receive!
Above the rank sedges, to note the gay twitting,
To fill up our cartridges, quaking with fear,
Lest Brown hearing too, be before us in greeting
The first snipe of the year!
We shout to our Boy, and we bid him be ready,
At first glimmer of dawn with a basket of "prog,"
And to hunt coolies up who are knowing and steady
At beating up game in each promising bog;
And we speak with affection, and anxious directing
Bidding mongrel pups, our instructions revere,
And tell them most wonderful legends respecting
The first snipe of the year.
By daybreak we've donned our most ancient of trousers,
Boots and coat only fit for an old clothes man's sack,
We whistle the "Tommies" and "Bullies" and "Towsers"
That form our remarkable nondescript pack,

* We regret extremely the carelessness of a foreman printer in the matter.—ED. *T.A.*

† Not quite: the 21st is our last—attaining our majority!—ED. *T.A.*

We mount our gay tat and give millions of orders,
To coolies, and beaters, then merrily steer
Through the mist to the swamp which we hope will afford us
The first snipe of the year.

Then we eagerly pull out our gun from its cover
And round us our cartridge-belt carefully strap.
We scorn the seductions of plaintive-voiced plover.
For the jungle-cock's crowing we care not a rap.
Down we crush past the screw pines, and through the thick sedges
And hope that the mist wreaths will presently clear,
Send Ninga and Carla to beat up round the edges
The first snipe of the year.

"'To heel,' all you puppies, no foolish skylarking,
Too serious this for mere skirmish and play."
Then our eager eyes strain where the coolies are marking—
Ah! ha! something rises, it's coming this way!
Bang, bang, go both barrels, at once almost firing,
The dogs, spite of shouting, rush forth from the rear,
Look sharp ere those juveniles spoil, past admiring,
The first snipe of the year.

We pick it up gently, was ere such a beauty?
Just look at its plumage, and length of its bill!
Then off tramp we once more, for we feel it our duty,
Ere we breakfast, at least one good game bag to fill.
What is that?—Oh good gracious, another gun popping!
Within us arises a terrible fear
Some one else with more luck than ourselves has been dropping
The First Snipe of the Year.

With rage in our heart through the swamp we go plodding
And wishing our rival were in it fast stuck,
Till we come on old Brown who is frantically nodding
And in stentorian tones is abusing his luck.
"Not a bird can I hit, though persistently blazing,
Away in the brown"—Then we give a wild cheer.
And draw from our bag, to his view high upraising
The First Snipe of the Year!

Ah! well, it is sport, and who'd think of ill-feeling
We stump on together, and share all our fun,
Till we feel rather limp, and our noses are peeling,
For above us is shining a powerful sun.
So we think about breakfast, and soon we are eating
Like warriors Homeric: ere long we clear,
Every dish, then praise thy life beauteous but fleeting
First snipe of the year!

We uncork in thine honour a fresh foaming bumper,
(For shooting produces a wonderful thirst)
Ah! our bags may contain others, sleeker, plumper,
Or larger, what matter when thou wer' the *First*.
To the puppies, who watch us with tremulous tails
We endeavour to make this great difference clear.
And with whinnies of joy each expressively hails
The first snipe of the year.

Then as we ride home, we think, how can we hinder,
Our cook, who is safe our best feelings to shock,
By reducing that snipe to a pitiful cinder
And serving him up upon toast like a rock!
Oh! dear little bird, what a brilliant example,
To our frail human nature, thine own doth appear.
In death as in life a most excellent sample—
First snipe of the year!

E.

LIQUID FUEL FOR OIL ENGINES.

Colombo, Sept. 20.

DEAR SIR,—Messrs. Brown & Co., Ltd., Nawalapitiya, write us under date 19th inst., as follows:—

"Our engine is still running perfectly with the Liquid Fuel and we have not cleaned it yet. It is exactly two weeks yesterday since we started running it continuously."—Yours faithfully,

DELMEGE, FORSYTH & Co.

PROPOSED INCREASED IN TEA CESS.

Rookwood, Hewaheta, 24th Sept.

DEAR SIR,—I enclose for publication copy of letter sent to the Secretary, Ceylon Association in London, with reference to the proposed increase in the Tea Cess.—Yours faithfully,

A. C. KINGSFORD.

Rookwood, Hewaheta, 22nd Sept., 1902.

W. Martin Leake, Esq., Secretary, Ceylon Association in London, 61 and 62, Gracechurch Street, London, E C.

Dear Sir,—At a meeting of the "Thirty Committee" held on the 13th inst, next year's votes were fully discussed and the following resolution unanimously adopted. Resolved:—"That with the present Cess Fund at the disposal of the Committee the following estimate for 1903, marked A, be approved, but the Committee strongly recommend that the Tea Cess be increased to half-a-cent per pound, and on that basis submits the appended alternative estimate, marked B, for the support and approval first of the Ceylon Association in London.

ESTIMATE FOR 1903 (A).

Green teas (7,000,000 lb at 4 cents) ..	R280,000
America	105,000
Continent of Europe ..	75,000
Administration, Contingencies, etc. ..	10,000
Total ...	R470,000

ESTIMATE FOR 1903 (B).

Green teas (12,000,000 lb. at 5 cents)	R600,000
America	105,000
Continent of Europe ...	75,000
Administration, Contingencies and unvoted balances ..	20,000
Total ...	R800,000

The meeting that passed the above resolution was thoroughly representative, twenty-eight, including all the Colombo members being present. I invite fuller consideration of the votes as explained under the separate headings below:—

GREEN TEA.—The manufacture of this continues to show a steady increase. The bonus has been paid on the following quantities:—

1898 ...	13,302 lb.	1901 ..	,590,000 lb.
1899 ..	86,327 ,,	1902 ...	2,316,921 ,, (to date)
1900 ..	472,294 ,,		
		Total	4,478,844 lb.

This figure does not quite represent all the green tea made, as the bonus is only paid on a certain proportion of dust and fannings on tea up to a standard. The supply of Ceylon green tea at present is not equal to the demand, the price has consequently risen lately three to four cents a pound, but many factories are now commencing to manufacture and it is hoped the output for the year will reach 4 millions for which a bonus at 5 cents. per lb. is available. This amount could, no doubt, be continued next year with little or no assistance in the form of a bonus, but to double or treble this total, many other estates must be induced to purchase the necessary

machinery to manufacture this class of tea, and for this purpose, it is essential that the bonus be continued. If a larger quantity is made the price, no doubt, will fall temporarily; therefore the bonus offered should be sufficiently large to prevent green tea manufacturers turning their attention to black tea, the moment the price of black tea rises slightly, or the green tea market falls. Many are considering the question of manufacturing green tea, and any reduction in the bonus just now, is, therefore, very undesirable. A normal increase during 1903 would show an output of "7 million lb. and on this quantity our funds permit of a bonus of 4 cents. per lb. only," But in view of the large quantity of faced teas now going forward, which appear to be competing favourably in the United States with Japan pan fired teas, given sufficient funds, a considerably larger quantity than 7 millions might be made next year. The Committee feel they should be in a position to encourage to the fullest possible extent, any demand for green tea that may arise, and it is for this reason alone, that they ask the permission of proprietors to increase the Cess to half-a-cent. per lb. It is generally conceded, that in manufacturing a considerable proportion of our crop into green tea lies our surest chance of improving the present position of tea producers and the prospects of success in this direction are very promising. Wherever our green teas have been introduced, in Afghanistan, Russia, Canada or the United States, the superior cup qualities of our tea have been at once recognised. These markets consume about 100 million lbs. of green tea.

The United States tea duty is to be removed on the 1st January, and dealers are, in anticipation of this, doing a hand-to-mouth trade, carrying only short stocks. This fact combined with the scarcity of Japan greens should afford us a great opportunity, during the early months of next year, for placing Ceylon green tea on a sound and permanent basis.

Continent of Europe.—The progress made on the Continent (apart from Russia) is of necessity slow, as the majority of the people do not drink tea. The small amount consumed is chiefly China, the bulk of which is laid down at Hamburg or Bremen at prices too low for Ceylon to compete with; but it is hoped that by steady persistence in pushing our teas, their better quality will bring them into use, and the same success in displacing China tea be obtained as in the case of the United Kingdom, Australia and Canada. A Renter telegram, dated London Sept. 10, "The trade returns show that the use of tea is steadily increasing in France, is encouraging; the reduction of the duty on tea in Germany next year should assist also.

The Committee have apportioned Mr Renton £5,000, or R75,000, for his 1903 campaign.

America.—The following remarks and figures taken from one of Messrs Gow, Wilson & Stanton's circulars are instructive:—"Considering the condition of the Tea trade in the United States and the heavy falling-off which took place in imports of other Tea into that country, it is encouraging to note that a larger quantity of British grown Tea has been taken. Prospects should be better when the duty which was put on as a war tax is finally removed.

CEYLON TEA TAKEN IN THE UNITED STATES AND CANADA.

1895	1896	1897	1898	1899	1900	1901
3,744,736	4,364,510	5,698,596	7,636,995	8,289,376	9,176,684	12,239,918"

During the same period Indian imports increased from four millions to seven millions. The above figures may be considered very satisfactory, shewing as they do a steady increase in the consumption of Ceylon tea, at a time when the total imports of tea into the United States were falling off, as a consequence of the war tax. With the early removal of this tax, the increasing amount of green tea to be introduced and the representation of Ceylon at the St. Louis Exhibition in 1904, the Committee feel the efforts of our Commissioner cannot at this time be relaxed, and that the Campaign in America should be continued at least to the end of 1904. We have set aside £7,000, or say R105,000 to be spent in America next year. Mr Mackenzie is to be asked to break new ground, farther West, in the vicinity of Chicago and St Louis.

Finances.—Estimating the crop next year roughly at 160 million pounds, at the present rate of Cess this would yield R480,000
add probable balance in hand at end of 1902 R20,000

R500,000

of which R470,000 has been voted, as per estimate (A), leaving a balance unvoted of R30,000.

If the Cess was raised to half-a-cent per lb the Committee would be in a position to make provision for 12 millions of green tea at 5 cts per lb.

It may not be necessary to impose the full amount of the increase; all we desire is that the limit of the present Ordinance be raised from 30 cts to 50 per 100 lb and that the limit need only be enforced, if the money is actually required for assisting the green tea industry. The Cess was introduced in the year 1894, for the purpose of increasing the consumption of Ceylon Tea in foreign lands, and how far this object has been attained, the following figures will shew. I again quote from one of Messrs Gow, Wilson and Stanton's circulars:—

	Ceylon tea taken in foreign markets. lb.	percentage of crop. per cent.
1895 ...	19,923,803	19
1896 ...	23,465,733	22
1897 ..	29,131,021	25
1898 ...	36,066,888	30
1899 ..	38,438,509	30
1900 ...	49,259,693	33
1901 ..	58,797,549	40

During the same period the Indian exports to foreign countries show only an increase from 17 million to 36 million pounds. "This opening of new outlets has practically saved the industry from ruin." Indian planters fully recognise the advantage we have derived from our Tea Cess, and their long agitation to obtain a similar levy, is likely to be shortly accomplished. Steps are being taken to bring about an understanding with the Indian Tea Association, regarding joint action between India and Ceylon wherever possible, and to thus avoid the wasting of funds, by working on contrary lines.

I shall be glad if you will kindly put the above-mentioned resolution and connected matter before your Association at an early date. I may mention that the Hon. Mr W H Figg will be in London shortly, and if there at the time of your meeting, he will be glad to explain matters still more fully, and give the resolution his support.—I am, Dear Sir, yours faithfully, A. C. KINGSFORD,
Chairman, Planters' Association of Ceylon.

CARDAMOMS IN CEYLON AND IN MYSORE:

SUPERIORITY OF THE LATTER.

Sept. 24.

Sir,—I notice that certain brands from the Native State of Mysore are included in your list of sales of 'Ceylon Cardamoms.' I enclose cutting of the same. These were shipped per 'Clan Macintosh.' Please reprint these to show that Ceylon is a long way behind Mysore still:—

CEYLON CARDAMOMS.

'Clan Macintosh.'—CCC in estate mark, 8 cases sold at 2s 10d, 1 at 2s 11d, 11 at 2s 10d; CT in estate mark, 3 cases sold at 2s 9d, 2 at 2s 10d;

MMM in estate mark, 12 cases sold at 2s 9d ; MG in estate mark, 1 case sold at 2s 8d, 2 at 2s 9d, 3 at 2s 10d.

Is the fact forgotten that the nomenclature of cardamoms in Ceylon is all wrong? Cardamoms, that are called 'Mysore' in Ceylon are really 'Malabars' or 'Alleppy.' Cardamoms that are called 'Malabars.' are really 'Mysore.' It is, I am afraid, too late to change this now. 'CCC' brand is Cadamony, 'MMM' brand is Munjanbulla, both being estates in Mysore. I do not think that, in the list of Ceylon sales, from which this cutting is clipped, any of the 'Ceylon's' have fetched over 2s.

LATE MYSORE PLANTER.

[Can our correspondent explain why the Mysore cardamoms should be so superior? Is it the better soil or drier climate—or both? Even then, some parts of Uva and Maturata should offer as favourable conditions?—Ed. *T.A.*]

CARDAMOMS IN CEYLON AND MYSORE:

ALSO ABOUT PEPPER AND TEA

PRACTICAL HINTS.

Sept. 26.

Sir,—In answer to your query *re* Mysore cardamoms I may state that the pubescent cardamom of Mysore (called in Ceylon "Malabar") has a far finer sample than the robust cardamom of Aleppy (called in Ceylon "Mysore") which now has taken the place of the other variety in Ceylon. Not only that; but I consider the treatment adopted in Ceylon is not so conducive to preserve the aroma as that on the estates in Mysore. In Mysore the cardamoms are dried by artificial heat and never see the sun until the bleaching process is begun. I should advise Ceylon growers to dry hard (preserving the green colour) and then have the cardamoms soaked, sulphured and bleached in Colombo. But to insure success you want some one in Colombo who understands the delicate handling of cardamoms. They should be spread on white cloths instead of dirty jute-hessian. This is not only a cleaner method, but the stray seeds from broken capsules are more easily seen and gathered. The two brands, I mentioned in my last letter, have never been sulphured. They are entirely sun-bleached. The sulphur processes, I think, cheaper and quite effective enough; but I never cared for the Ceylon way of sulphuring the cardamoms in the green stage. This leads to premature exposure to the sun which not only causes the cardamom to split, but also robs the delicate spice of much of its precious aroma. More care should be taken in picking the fruit. Where I was, the gangs went round every eight days (like tea) and boys were put on behind the gangs to find any missed ripe fruit. For every missed fruit the boys demanded six fruits from the peccant picker. Thus there were no fruit over-ripe or under-ripe if the gangs were well supervised as on a tea estate. Thus the sample was even and good. (Do your Pepper-growers know the advantage of "boiling" the berries? It's a good tip.) I consider that severe pruning of tea is ruining your bushes and causing planters to fall back on manure. This is not healthy. Prune lightly, dig your land, and pluck lightly.

LATE MYSORE PLANTER.

SUPERIORITY OF PRODUCTS IN INDIA.

Dear Sir,—You ask why are Mysore Cardamoms superior to those of Ceylon; but why I may also ask was "Cannon's Mysore Coffee" superior to the very finest Ceylon Plantation in its day; while again Cochin Copra and Coconut Oil are always quoted at a considerable advance over Ceylon; and finally nothing in Ceylon can touch Darjeeling Tea! So you islanders ought to

CRY SMA'.

[Very true; but there are a few things in which we are unapproachable, at least by India:—Our Cacao, highest price in market; our Cinnamon, the only perfect spice(!); our Plumbago; and now our Rubber and, last not least, our Green Teas!—There is nothing like having "a gude conceit" of ourselves.—Ed. *T.A.*]

COCONUT WATER.

Dear Sir,—An English visitor to Colombo, who had been a wine merchant in London, casually mentioned to me that he thought a capital and suitable drink for Ceylon could be prepared out of coconut water. He said it was having his attention, but I have heard nothing more yet. I send you his name for your private information. As he well remarked, our aërated drinks, such as lemonade, &c., were not light enough for the climate.—Truly yours,

INTERESTED.

[We fear the gentleman named will never be well enough to continue his experiments. Some one else should take the matter up.—Ed. *T.A.*]

NEW AND MINOR PRODUCTS IN THE LOWCOUNTRY OF CEYLON.

Sept. 24th.

Dear Sir,—In the "Agricultural Magazine" for August, the first article is on Keppetiya and

BETEL.

Agriculture is sure to advance, if all Mudaliyars and chief headmen in the island were to take as great an interest in it as does Mr. George Weerakoon, Mudaliyar of the Wellaboda Pattu, Matara. His communications on various agricultural subjects very often find a place in the pages of this useful Magazine.* It is to be hoped that this progressive Mudaliyar inculcates his views on the people under his charge, through his subordinate headmen. Why should not every Mudaliyar and his equivalent in the other Provinces, and aye, every Kachcheri as well, have small model gardens as object lessons and for the distribution of seeds and plants? All villagers believe in the virtues of Keppetiya (*croton lacciferum*) as a manurial agent, and use it in betel and garden cultivation. All aromatic smelling leaves are said to be valuable as fertilizers. Besides acting as mulch, Keppetiya leaves decay rapidly and becomes available as manure.

In "Notes," reference is made to the believers and unbelievers in the encouragement of the growth of

* Which, it may be mentioned, is regularly incorporated with the *Tropical Agriculturist.*

MIMOSA ON COCONUT ESTATES,

as a means of utilising this plant to attract to the soil supplies of nitrogen from the atmosphere I have heard it stated that one enthusiastic believer in it, stated that by encouraging its growth, he found that he not only secured better crops, but the kernel of his nuts was thicker than before and yielded a larger proportion of oil. The mimos is spoken of as "modest." I will call it "aggressive" or "assertive." Once let it get into your estate and you will have a constant battle to get rid of it. It is as difficult to be got under subjection as the Boers were. I have noticed parts of coconut estates over-run with it, and the trees were, by no means, looking better than their neighbours. But, says the enthusiast, to derive benefit from the mimosa, you must turn it into the soil. Why attribute any improvement that takes place in the condition of the trees to mimosa alone, and give no credit to the tilling of the soil and the green manuring involved in the operation? The benefits of both are beyond question. In European agriculture, clover was long known to leave the soil richer in nitrogen after the crop than before. Yet it was not dug into the soil, but was removed for fodder. Experiments have established that all legumes have bacteria-infected nodules, which have the property of converting the free nitrogen of the atmosphere into combined nitrogen assimilable by vegetation. The modest "pilla" is a leguminous plant growing on coconut estates, whose leaves, both here and in India, are used as a manure. The growth of the plants might be encouraged round the stems of coconut trees, in preference to the "touch me not," more true as regards its aggressive thorns, than its shrinking sensitiveness.

FLORIDA BEANS are much used now as an article of consumption. The possession of a deleterious principle in the bean, which is said to induce colic, has been overcome by first boiling the beans in water mixed with turmeric and salt. The hairs are all rubbed off, they are then fried with onions and made into a curry. A tree has been discovered, the wood of which, when partly cut, emits a strong odour of iodoform. I have met with a red, clayey soil in the hills of the Morowakkorale emitting a decided odour of iodoform.

The sixth lecture on PLANT LIFE is very attractive, and is very instructive reading. The best soil for cultivation should contain :—

Sand	50	to	70	per cent.
Clay	20	to	30	,,
Humus	5	to	10	,,
Carbonate of lime	5	to	10	,,

Alluvial soils are fertile by reason of the action of running water mixing their constituent parts thoroughly. A soil composed entirely of sand is valueless agriculturally, as it is non-retentive of moisture and has no plant food. Clay alone is as unsatisfactory as sand. Its close texture renders it impermeable to water, it is cold and damp and will bake as hard as a brick in dry weather, and is of no value as plant food. As a soil constituent, sand renders a soil porous and permeable to air, moisture and warmth; while clay absorbs gases from the atmosphere, keeps a soil moist and cool and is retentive of plant food, which would otherwise be washed out of it. The impurities of clay and sand are potash, magnesia, lime, iron, &c., derived from the rocks which are the origin of soils; these are important constituents of the mineral food of plants. Sand and clay form the bulk of soils. Lime is a plant food and decomposes organic matter which supplies the nitrogenous food of plants. Nitrogen is at its highest in a peaty soil and at its lowest in a sandy soil. Clay soils have most phosphoric acid and in sandy soils the least. Clayey soils are also rich in potash, and calcareous soils are rich in lime. Sandy soils are deficient in both.—Yours truly

SCIENCE AND PLANTING.

LIQUID FUEL INSTALLATION.

Colombo, Sept. 30.

DEAR SIR,—Messrs. Brown and Company, Limited, Nawalapitiya, write us under date 29th instant, as follows :—" Oil Engine. We cleaned our Hornsby Akroyd Oil Engine yesterday, not because it showed any signs of wanting to be cleaned, but because we were anxious to see in what condition it was in, to enable us to form an opinion as to how long it would be advisable to continue running it in future without cleaning."

"There was a small quantity of deposit at the back of the Vaporiser, but the front of the Vaporiser and the back part of the cylinder were quite clean. The piston was clean and bright, and the rings were quite loose. The engine had run 23 days without cleaning, so that in future we will not need to clean it more than once in 4 to 6 weeks. It was running as well at the end of the 23 days as it did on the day it was started."—Yours truly,

DELMEGE, FORSYTH & CO.

CEYLON PATENT OFFICE DILATORINESS.

Stagbrook Estate, Peermaad, S, India,

Sept. 30.

Sir,—With reference to your para, in the issue of the 25th September, regarding the "Deane-Judge Patent Strainer" you hint at other "patents being before the public ere long." This may be the case, but all I can say is that it is ten months since we applied for our Ceylon Patent and we can't get a definite reply from the Ceylon Patent Office. Considering that at the present moment there is, as far as I am aware, only one patent in existence as regards green tea manufacturing appliances, and it has taken the Ceylon Patent Office ten months to search the records, what price a speedy issue of other patents? Meanwhile producers spend at least 10 per cent more on production than need be the case, and we are unable to advertise freely the exact nature of our improved machinery which will so greatly economise the manufacture of "Green Tea," and would probably mean that a 4 cent bonus would be more remunerative to Green Tea Producers than a 5 cent bonus is at present.—I am, Sir, yours faithfully,

H. DRUMMOND DEANE,

PARA RUBBER IN MATALE.

Kepitigalla Estate, Matale, Oct. 1.

DEAR SIR,—I think the following sale of three cases containing 336 lb. nett of Para rubber grown on Kepitigalla estate, would interest those concerned in rubber cultivation, and also show that high prices can be obtained for rubber grown in Matale district. The price of fine Para, at the same sale, early this month, was 3s 0½d and three cases Kepitigalla sold for 3s 10½d, a price 10d above best Para. I have just despatched another 13 cases, and shall let you know results of sale. You will notice that the fine price 3s 10½d has been obtained for a large quantity (for Ceylon) and not merely for a few lb. which could be specially cured.

I will also take this opportunity to reply to the "Critic" in the "Times of Ceylon" who wished to make out that this estate was not in the Matale district. Kepitigalla estate proper is in the Matale district, as I know, when I have had to deal with the Village Headmen and Government Agents. Your contemporary's "Critic" might just as well say Yatewatte is not in Matale, as a good portion is in Kurunegala, and even facing Messrs. Finlay, Muir & Co.'s Delwita estate. But why particularise as to our boundaries? The fact remains that Para rubber has been most successfully grown, and proved to be of commercial value, and yield handsome profits. As I have proved by figures in my last letter it has cost 47 cents in Colombo or, say, 50 cents in London, and practically yielded a clear profit of R2·38 per lb. I also notice in the *Tropical Agriculturist* for September an article on Vanilla in Ceylon, where, it is stated that 70 beans was considered good for a vine. I have vanilla growing on this estate, 60 to 80 feet in length, trained on poles, 4 feet above ground, with 300 to 350 well-developed beans 5 to 9 inches in length, mostly about 7 to 8 inches, and have many vines with 150 to 200. I shall be pleased to show any one interested in vanilla cultivation, over the part of estate where the vanilla is grown, —I am, Sir, yours faithfully,

FRANCIS J. HOLLOWAY.

CEYLON TEA FOR AMERICANS IN THE PHILIPPINES.

Mindanao, Philippines.

SIR,—The aggressive operations for disseminating knowledge concerning Ceylon teas and the amount of money and energy the Ceylon Planters are expending on the above, leads me to make a suggestion nearer home. You are making efforts to educate the United States people to drink and judge good tea. So why not try them in the Philippines where there are over 30,000 soldiers and about 5,000 American civilians. The U. S. Army calls for tenders in Manila to supply the soldiers with tea and, if your planters could furnish the tea to them at, say, even cost for a trial or two, it would be money well-invested in my opinion, for the reason that when these thousands learned to drink Ceylon tea they would, on returning to their homes all over the States, be an advertisement in themselves as well as being consumers of the tea. Think of the influence these people would have in pushing your teas in their home districts which would embrace every State in the Union. I know locally the officers and their wives are enthusiastic on Ceylon tea. I always use it and everyone who drinks it in my house say: where did you get it?— procure some for me and I have been doing so though with difficulty I have to send to Borneo and the steamer connections with Sandakan are very poor. I have no hesitation in saying that your tea once introduced to Americans in the Philippines, they would carry the flavour home and want it there. At present the army is using China teas and are paying —* a lb. I was a buying agent for two years for a Manila firm of Government contractors and in that capacity travelled over Australia, China and Japan; the former for meat and produce and the latter for produce and tea, and after seeing the Chinese and Japanese coolies preparing the leaf, I never drunk tea from these countries. The rolling and roasting process of fire dried teas is especially disgusting, where the women, in an almost nude condition are bending over the fire-pans and rolling the tea around, while the filth and perspiration dropping off their warm bodies into the pans is a sight that once seen, needs no further persuasion to abandon drinking these teas. There are a great number of army ladies in the Philippines, and as all ladies like good tea, I am sure they would be staunch supporters of using Ceylon tea on economical grounds alone, as a good tea is a cheap tea.

FRANK J DUNLEARY.

THE OBNOXIOUS PREPARATIONS OF CHINA AND JAPAN TEAS:

MORE AUTHENTIC "COPY" FOR A P. A. PAMPHLET.

Degalessa, Yatiyantota, Oct. 12.

SIR,—I have read Frank J Dunleary's letter in the *Observer* of 10th inst., and I can corroborate every word he says on the rolling and roasting process of Chinese and Japanese teas, having seen the working of teas outside Foochow and near Hiogo or Kobe. The pan system is accurately described. I went through a tea making Factory at Kobe; the pans were copper or brass and set at an angle on "chullu" fires, and the workers at the pans were just as Frank J Dunleary describes; the heat was awful and exudation of perspiration great, the building itself was very dirty, and the tea chucked into a corner of the room when finished. Much the same process was in use at Foochow by the Chinese: the only difference was that the Chinese rolled the tea with their feet by holding on to a bar; the Japs rolled it by hand.—Yours truly,

WM. MITCHELL.

RAINBOW TROUT.

North Cove, Oct. 2.

SIR,—An impression seems to have got abroad amongst fishermen, especially in the neighbourhood of Nuwara Eliya, that rainbow trout as soon as they attain a weight about a pound, disappear —the presumption being that they drop downstream and seek deeper and larger pools in the lower waters. This may apply to the Nuwara

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* A blank here in letter.—ED. T.A.

Eliya fish with the lake so handy to them, but my experience of them in the Horton Plains and Aldie patana stream hardly bears this out. The first rainbow trout turned down into the Horton Plains stream—some thirty or forty in number so far as I can recollect—were brought up in the stew-pounds there and turned down by me more than two years ago not far from the Rest-house. The year following I caught one or two of these fish of over a pound in weight near the top waterfall above the Ohiya short cut, and this season a fish of 2 lb was taken in the waterfall pool itself. These fish by their weight and size must have been some of the first lot turned down, and they must have travelled up stream some three miles or so. In addition to this evidence, I have seen many good fish of the rainbow species quite recently in the upper waters of the Horton Plains stream. My belief is that if they have a tendency to work down-stream in England (and tradition certainly ascribes it to them) here in Ceylon this tendency is checked by the numerous waterfalls they have to encounter. I don't say that some do not go over the falls, but many are in my opinion induced to head back up-stream as soon as they feel the vibration caused by the fall below them. I will also give the result of my observatains of these fish on the Aldie patanas. There were about 200 fry and all were turned down in one small pool about 20 feet in length and 15 feet wide—and about 150 yards above some small falls and broken water rushing through a rocky gorge. Six to nine months afterwards I counted over 20 well-grown fish in the pool and in the slack water above the falls. After this they seemed to scatter and a few months afterwards paired off, one pair remaining in the original pool where they may be seen to this day, splendid fish of nearly 2lb. in weight. Another pair have established themselves about 60 yards lower down and another pair close to these. Up stream, judging by the number of fry to be seen there, must be many more survivors of the original and *only* lot of rainbow trout ever introduced into this water. It may be well to mention that except to provide a specimen for the managing Committee of the Ceylon Fishing Club, not a single fish has ever been taken out of this stream. In view of the above, I think, it a little premature to conclude that all our rainbow trout are going to disappear and work down into the low-country, and that we should therefore stock with more brown trout. Personally, I look upon these latter as a source of great danger to the young fry now being hatched in our streams. My reason for this opinion is that where brown trout are most numerous on the Horton Plains, country-bred rainbows are few and far between. On the Aldie Patanas, where there are no brown trout, the water teems with country-bred rainbows, and below Baker's Falls on the Horton Plains, where brown trout were only once turned down in any numbers, and where very few now survive, the rainbow trout are very numerous. All this points, I think, to one conclusion that the brown trout are devouring the ova and fry of the rainbows. It may be of interest, to the fishermen to know that these rainbows breed in Ceylon, apparently, from June to December, if not all the year round. A few days ago I observed numbers of fry not more than 1½ to 2 inches long, and shoals of others ranging between 3 and 10 inches. I would ask you to publish these notes for the information of those who may be interested in them, and who have not the same facilities I have had for observing the habits of Rainbow Trout in Ceylon waters.—Yours, &c., THOS. FARR.

No. II.

Abbotsford, Oct. 7.

SIR,—Mr. Farr's letter on the above subject, in in your issue of the 6th. is most interesting reading to all local fishermen; but he mustn't run away with the idea that because rainbows stick to the Horton Plains and Aldie Patana streams they are non-migratory fish.

He doubtless read the recent Report of the Australian Fishery Board in which it was stated: "Rainbows have done exceedingly well in some rivers and in all lakes and ponds; but they have most mysteriously disappeared from several of the rivers into which they were put."

That they disappear from the Nuwara Eliya stream when they attain a respectable size is undoubted; and not only do they descend into the lake, but they actually go over the spill as there is a well-authenticated case of a rainbow having been caught in the stream below by Mr. Purdon.

This fish had been feeding on minnows or young carp and yet rainbows are said to be non-cannibalistic fish, but I fear me they will lose their fair fame in this climate. All the Salmon tribe go up stream to spawn, but it doesn't follow that they'll stay there. Why blame the browns for the paucity of local-bred rainbows in the upper stretches of the Horton's stream, seeing only 30 to 40 fish were originally put into miles of it only some two years ago? I killed a couple of them last year myself, weighing each 1½ lb., right away up beyond Ohiya short cut, and this in one day's fishing. So, how many, or rather how few, can have escaped the men who fish there frequently?

Why also preserve the Aldie stream so carefully, when the Dikoya and Agra rivers are crying out for fish?

They'll go on crying, I expect, for the next decade, whilst the fish in the Aldie are dying from disease through overstocking, unless our petty parochial Fishing Club can rise beyond the selfish idea, of all the fresh fish and the butter and the buns for our side of the country, if you please!—Yours, &c.,

JOHN FRASER.

WANTED:—CHEAP FREIGHTS TO AUSTRALIA:

1D. A LB. CHARGED ON CEYLON TEA; ONLY ½D. ON CHINA OR JAPAN TEA;—A REAL GRIEVANCE.

Colombo, Oct. 10.

SIR,—I have read with interest the correspondence which has recently appeared in the local press on the point of having cheap passages between this and Western Australia, a very desirable thing, and worthy of strong support from all our newspapers.

There is, however, something more important and more pressing than cheaper passages to Australia, and that is cheaper freight. You can ship cargo by P. & O. or other mail steamers to Hongkong, a voyage of 10 days, at R14 per ton, whereas for the voyage to Freemantle, a voyage of only 9 days, the unfortunate producer of tea has to pay R50 per ton.

Again you can ship by these A 1 mail steamers to Japan, a voyage of under 20 days, at R20 per ton, whereas to Adelaide, Melbourne and Sydney (three ports which, I believe, the Colombo tea market is strongly dependent upon) you again pay R50 per ton.

I have seen this subject mentioned from time to time in the proceedings of the Planters' Association or the "Thirty Committee," and I should like to know if there is any prospect of this glaring anomaly being "gone for" again, and more energetically than in the past.

Why should the struggling tea industry have to pay 1d per lb. freight to one of its largest and increasing consumers, when for one-third of this freight you are offered steamers of the same Companies for countries to which our exports are almost nil, and which even in the future are not likely to take our products, no matter how cheaply you could ship them? On the other hand, these very countries I refer to, viz:—China and Japan, can send their teas down at a freight of ⅓d per lb. to the Australian markets. ⅔d (three cents) per lb. on Ceylon teas would be a welcome addition to the income of many who hold

TEA SCRIP.

PLANTING NOTES.

THE GREAT VINE at Hampton Court is often referred to as showing how long a plant will live and bear pruning and cultivation. This vine is supposed to be over one hundred-and-thirty years old. The latest report is from a London paper dated September 24th:—

The great vine at Hampton Court Palace, which is now 134 years old, is this year only bearing 700 bunches of grapes, nearly 3,000 bunches having been thinned out to give the tree a rest.

THE EFFECTS OF FUEL OIL—in reducing freights, in the Western World principally, are fully dealt with by Sir Marcus Samuel in an article reproduced elsewhere from a home paper. The advantages associated with the substitution of fuel oil for coal are so apparent and manifold that it is surprising that in Eastern lines it is not more universally used. Its adoption in the West has literally revolutionised shipping freights: similar advantages would be welcomed in Ceylon and we trust these satisfactory results are but the precursor of what we will shortly experience through the adoption of liquid fuel by Eastern lines.

IN PURSUIT OF PARASITES—Mr Geo. Compere, the entomologist of the Department of Agriculture, departed yesterday on a journey to various portions of the globe in search of the parasites of certain noxious insects. He will proceed to Sydney, thence to China and Japan, where he will endeavour to get the parasite of the red scale. From Asia he will cross to Washington, and after a brief stay in the United States he will continue his journey to Italy, in which country he is hopeful of securing the parasite of the fruit fly, a pest which has caused heavy losses to fruitgrowers in several parts of the world.—*Australian paper*, Oct 4.

MANURING TEA.—Mr. W. D. Bosanquet has undoubtedly conferred a special benefit on his brother planters in tea by his very practical and sensible observations on this subject. He shows how the "forcing manure," most commonly in vogue, is open to condemnation, and he clearly indicates how each planter may do much better for his estate and work more economically as well Mr. Bosanquet's motto must be "Science with practice." We wish he had told us something on the value of burying tea prunings. He speaks highly of the usefulness of albizzia trees among tea; but Mr. Bamber's recommendation is in favour of cultivating a leguminous plant like *Crotolaria striata*, a herb (2 to 3 feet high) common on waste ground in the low country and about Kandy: it flowers in December-February a dull yellow veined purple; pods long and plenty of seeds. We trust Mr. Bosanquet will have more to say about his manuring experiments ere long.

THE TOTAL YIELD OF GOLD FROM THE BRITISH Isles (says Mr. J MacLaren, F.G.S. in the *Mining Journal*) may, with the exception of the quota from the Leadhills, in Scotland, be computed with sufficient approach to accuracy to give considerable value to the estimation:—

	£
England (North Molton, 1852-3) ..	581
Wales (Dolgelly area, since 1844) ...	281,497
Scotland (Leadhills area, 1511-1616) ...	100,000
Sutherland (1868-1869) ..	3,000
Ireland (County Wicklow, 1795-1879)..	21,855
Total gold yield of British Isles ...	413,933

Of this sum it will be seen that nearly all, with the exception of that from the Leadhills, has been obtained during the last century, and slightly more than half of it (£208,855) during the last 14 years.

ARBOR DAY.—It is gratifying to find that active steps have been taken to give practical effect to the suggestion made in the *Agricultural News*, of establishing an Arbor Day in the West Indies. At Trinidad Mr J H Hart reports that a tree was planted on Coronation Day (August 9), in the Queen's Park Savannah by His Excellency the Acting Governor, Sir C C Knollys, K C M G. Mr Hart continues:—'It is a practice which would tend largely to the benefit of the community and in which the poor as well as the rich may share; and August 9 each year (a specially suitable time in Trinidad) might well be commemorated by the planting of fruit, timber, or ornamental trees.' At Grenada His Excellency the Governor planted a Genip-tree immediately after the Coronation service in the presence of a large number of the officials and other residents of the island. Mr Broadway, the Curator reports that in all eighty-five trees were planted some on July 2, the remainder on August 9. At Tobago and other islands also, several trees were planted on June 26 and several further Coronation trees on August 9. —*Gardeners' Chronicle*, Sept 27.

THE DUCKWARI (CEYLON) TEA PLANTATION CO., LIMITED.

REPORT BY THE DIRECTORS TO THE TWELFTH ORDINARY GENERAL MEETING OF THE COMPANY.

17 Philpot Lane, London E C Sept.

The Directors beg to submit the accounts for the year ending June 30th, 1902.

Including the balance brought forward from last year, and after writing off ten per cent depreciation in value of Machinery and Buildings, the balance at credit of Profit and Loss Account, subject to Income Tax, is £1,506 5 6

From this has to be deducted an interim Dividend of 3½ per cent on Preference Shares, paid February 14th 1902 420 0 0

Leaving £1,086 5 6

which it is proposed to appropriate as follows:—

(1) To pay 2 per cent arrears in Preference Dividend ...	£240 0 0	
2) To pay 3½ per cent Dividend on Preference Shares ..	420 0 0	
(3) To pay 2½ per cent Dividend on Ordinary Shares ..	200 0 0	
4) To carry forward balance to next year	226 5 6	
		£1,086 5 6

The returns of crop have been 320,070 lb. Tea and 14,283 lb. Cardamoms, against 301,530 lb. Tea and 8,779 lb. Cardamoms in previous season.

The past twelve months have again been very unfavorable for Tea owing to the continued excessive supplies. On the other hand, the Company has much benefited by the large crop of Cardamoms received, the same being 5,283 lb. in excess of expectation.

The estimates for the coming season are 300,000 lb. Tea and 10,000 lb. Cardamoms.

The machinery and buildings are maintained in a good state of repair.

Mr SPENCE retires from the Direction by rotation, and being eligible, offers himself for re-election.

The Auditors, Messrs. BROWN, FLEMING and MURRAY, also retire, and offer themselves for re-appointment.

G. P. SPENCE, Chairman. R. CROSS AITKEN, Secretary.

GAME PROTECTION AND HUNTING IN THE HILLS OF CEYLON.

Mr W Ormiston, Hon. Secy. of the Haputale Branch of the C G P S, writes to our contemporary as follows :—

The only fault I have to find with the form of license agreed on at the meeting, is the inclusion of the old limit "*over 4,000 feet elevation.*"

This is the main point on which our fight took place a year ago, and it was then *unanimously* agreed that the limit should be *the country alloted for hunting to the knife by registered packs.*

The boundaries of this country, in the province of Uva, were agreed on by the Assistant Conservator of Forest, Hill Reserves (Mr Spence), and myself; and I have sent them to the Government Agent, Uva, because a small corner of Uva is occasionally hunted by a knifing pack (I understand the Horton Plains were only hunted once last year), the shooting of game over 4,000 feet elevation has been entirely prohibited and is now to be limited to stalking.

The minority may have their rights, but surely those of the majority require some consideration.

Another question which might, with advantage, have been discussed is that of limiting the number allowed to be killed under each license. When *shooting* in the Southern Province, I am limited to *three* sambhur (two bucks and one doe); if I hunt with knife in the Hills, there is no limit in number or sex.

I have been asked to bring this question forward at the next general meeting.

RUBBER IN TOBAGO BOTANIC STATION.

In April, 1900 ten plants were put out into the open ground, and in May, 1902 are in flower. In the young state the trees assume a shrubby appearance, but later takes on its true aboreous character. I have seen trees of this rubber [which rubber?—ED. *C.O.*] 80—100 feet in height in the forest behind Lagos. Even in a young state this tree produces latex which readily coagulates.

The following table shows the growth of the various rubbers at the station :—

Castilloa elastica	planted 1900	..	19 feet
Hevea Braziliensis	do	...	17 do
Funtumia elastica	do	..	10 do
Manihot Glaziovii	...	...	15 do

Castilloa and Funtumia have both produced flowers.

RUBBER STATISTICS.

CONGO.—The British Consul at Congo, in his report of the trade during the year 1901, states that by far the most important article of export continued to be rubber, which accounted for £1,758,683 in special and £1,807,327 in general commerce, out of the totals of £2,019,536 and £2,160,302 respectively. According to destination the exports of rubber were divided as follows :—

Destination.	Value. Special Commerce. £	General Commerce. (including transit). £
Belgium	.. 1,713,992	1,747,323
Netherlands	.. 43,167	56,992
Germany	.. 272	433
United Kingdom	.. '188	1,162
Other Countries	.. 185	1,417
Total	£1,758,638	£1,807,327

GERMAN EAST AFRICA.—The prospects of the rubber trade here are not very promising : thé value of that exported having fallen from £66,859 in 1899 to £52,933 in 1900. Efforts are being made to arrest the depression that threatens this trade, and the stations in the rubber districts are making extensive experiments with the planting of new trees.

CAMEROONS.—Rubber is one of the most important articles of native trade, though, in consequence of the falling-off of the supply in those parts of the country from which it has hitherto been obtained, it is only by the opening-up of fresh districts that the trade can be kept to its present standard.

VERA CRUZ.—Rubber passed through Vera Cruz during the two years from July 1st 1899, to June 30th, 1901, to the amount of (1899-1900) 85 tons, value £20,406, (1900-01) 60 tons, value £13,512, being a decrease of £6,894.

MOLLENDO.—Mr Vice-Consul Robilliard reports as follows for the year 1901 :—The rubber industry still occupies a good deal of attention, and although the quantity shipped this year only exceeds last year's output by fifteen tons, this is accounted for by the fact that large quantities are being prepared in the interior ready to ship when the dry weather sets in, which will be from the beginning of April. A few remarks on the difficulties that may attend this industry may be of interest. From the time of landing here, about fifteen days will be occupied in travelling by train, steamer, mule and canoe to get to the rubber districts. The first range of

the Andes has to be crossed at seventeen thousand feet above the level of the sea before the descent into the valleys can be effected. Sorata, in Bolivia, is the place at which nearly all the roads into the rubber and mining districts converge. The traveller will often be delayed for several days, all the owners of beasts of burden take advantage of the scarcity of the means of transport, and extort the highest possible freights for their animals. Once work has been started, the cheaper plan is to buy mules and horses. All supplies have to be carried in, as scarcely anything can be purchased there. However, stores are gradually being established on the different claims. The descent is very dangerous in some places, the incline being from thirty to forty-five degrees, and the animals often slip and are thrown over the precipices. This part of the road, twenty-three miles in length, takes twelve hours, when Pararani is reached 4,600 feet above the sea level. From Pararani to Mapiri the road is more practicable, and rubber, Peruvian bark, and coffee plantations are met. Mapiri is the centre of these regions, and from there one strikes off to wherever the claims may be. At least ninety per cent of the travellers fall sick with malarial fevers, more or less intense, although seldom fatal. From Mapiri, Guanay is reached in canoes, or rafts, made of nine sticks fastened with vines; three of these rafts form what is called a callopo, capable of carrying one and half tons of cargo. The distance is sixty-two miles, and can be done in one day, going down stream, but coming back it takes three days, current running six miles an hour. The Indians can only pull at the rate of one and half miles an hour. From Guanay there are roads that lead to the placer mines on the rivers Tipuani, Coyahuira, Challana, etc., in which, regions gold is found in abundance, but machinery is badly required, especially to dredge the rivers. The rubber exported from Mollendo during the year 1901 was as follows:—To the United Kingdom (London) 13,061 kilos, (Liverpool) 206,142 kilos; to Germany (Hamburg) 60,707 kilos; to France (Havre) 3,119 kilos; to the United States (San Francisco) 12,859 kilos, making a total of 295,898 kilos, approximate value £58,180.

Gambia.—The quantity of rubber exported in 1900 was 125 446 lb. in 1901 146,573 lb. being a decrease of £1,254 in value.—*India Rubber and Gutta Percha Trade Journal*, Aug. 4.

THE RAILWAY AND COTTON-GROWING IN THE NORTH OF CEYLON.

The Government of Ceylon, writes one interested, should give full attention to Cotton-growing in the North (see Sir Ed. Cotton's speech at Accrington); but there must be population to provide labour, and gins to gin the cotton on the spot. It will grow like a weed: not the slightest fear as to the growth and suitability of climate.

"In this connection, it seems to me that Government, whilst constructing Railway and Irrigation works, should be taking steps now, either to induce the necessary population to come to the country, or to offer facilities to Syndicates or others willing to take up tracts of land for cultivation. The most liberal terms should be offered and it is not a day too soon, to begin; for, it takes a long time to get people outside the island to become interested. It won't do for Government to wait till the line is running before they begin to invite settlers to cultivate."

THE BRITISH ASSOCIATION AND CEYLON.

Mr A K Coomaraswamy, B SC, F L S, F G S, read a "Note on the Scenery of Ceylon," in the Geology section on the 16th September. He stated that it was probable that Ceylon had been exposed to continuous denndation since very early Paleozoic times. The foliation of the crystalline rocks had a marked influence in determining the directions of the river valleys and the general configuration of the country. A characteristic feature of the scenery of Ceylon in many parts was its precipitous character; the seemingly "bedded" granulites formed mural escarpments and dipped slopes, as if they were a series of sedimentary rocks. The above remarks applied only to the mountainous districts which occupied the south-central part of Ceylon. A low coastal plain fringed the island, partly of alluvial and partly of raised beach origin; sea cliffs were absent or very unusual, and even any coast exposures of rock were not common. In the north a greater area was flat and low, and the scenery resembled that of Southern India. Isolated hills of gneiss (Dambulla and Sigiri rose conspicuously from the plain.

PARAGUAYAN TEA.

Yerba Mate in Paraguay.—The British Consul reports that yerba mate, or Paraguayan tea, is largely exported to the various Republics of South America. A few sample packages have been shipped to the United States and to Germany. One sample has been forwarded from Consulate to a firm in London. A German house here prepares a refine form of yerba mate suitable for drinking like tea. It is packed in parcels of 2 lb., at a cost of 1s 6d. There seems, says the Consul, to be little doubt but that yerba mate is a great restorative in hot weather or after physical exhaustion.—*British and Colonial Druggist*, Sept. 5.

A VISITOR FROM JAVA.

Mr. H J H Netscher, a well-known proprietary planter in Java, after visiting the tea estates in Northern India—in Assam, the Dooars, Darjeeling, &c.,—arrived in Ceylon where he remained about three weeks last month. Mr. Netscher's property is in Western Java, and he chiefly cultivates tea and cinchona. Cacao he considers to be about the most troublesome of tropical products to cultivate—the plant, of all others, most liable to enemies—at least that is Mr. Netscher's experience in Java. This is in strange contrast with the Dutch writer's experience of cacao in Dutch Guiana, South America, where, he said, the trees began to crop well at 5 to 6 years, heavily at 9, and continued then for a hundred years to give regular crops and no trouble. [This Surinam news is, however, a little too much like the parrot the sailor bought because he was told it would speak after 100 years and he wanted to hear it!] In Java evidently cacao is not a

favourite with big planters, though it is grown freely by the natives along the wayside and in small gardens. Mr. Netscher speaks of the telephone connecting plantations all over Java with the capital and principal towns as extremely convenient. He can get switched on at the nearest railway station with his agent in Batavia over 100 miles off, and do business more satisfactorily in five minutes' conversation than through pages of a telegram. At the same time he can telegraph from his residence to any part of the world. The labour supply is no trouble nor difficulty in Java.

Mr. Nestcher, who carried a letter of introduction to the Governor Sir West Ridgeway, went first to Kandy and from thence made excursion into the planting districts. He also visited Nuwara Eliya and Bandarawela and returned to Colombo *via* the Kelani Valley and the Avissawella railway. We bespoke courteous attention to this intelligent visitor during his stay in our midst.

EXPERIMENTS WITH AUSTRALIAN FODDER GRASS.

The experiments made at Saharanpur with the Australian fodder grass, *Paspalum dilatatum*, did not indicate that the grass possessed any remarkable superiority over the best varieties of Indian fodder grass, and much the same conclusion is to be drawn from experiments made in the Central Provinces, though there, as at Saharanpur, it is considered necessary that further experiments should be tried before a definite opinion is pronounced. So far as the experiments have gone, they show that the yield of the new fodder grass is smaller than that of the local grasses, but the quality is much better. Though protected from grazing the plants died, unless irrigated after producing one crop. The grass failed to show any special drought resisting properties; in fact it dried up earlier than the local varieties. It did better on heavy black soil than on dry stony land, but did not spread and multiply as *dub* grass does. It failed to justify its reputation as a strong pushing variety able to oust weeds and other grasses; indeed, it was found necessary to weed it, to prevent its being smothered and overgrown.—*Madras Mail*, Sept, 2.

ADULTERATING RUBBER.

According to a Foreign Office report from our Consul at Dakar a crisis was due to the fall in the price of rubber, which, while it affected all the rubber-producing countries, was specially felt in French Guinea, eight-tenths of whose exports consist of that article. In addition, there were special reasons which caused the colony to suffer. Having been a rubber-producing country for many years, the wines owing to wasteful methods of tapping them, had become comparatively scarce, and in order to increase the quantity of rubber for sale, the natives adulterated it in various ways. The merchants, anxious to profit by the high market, accepted the bales without examination, with the result that the rubber bought from the natives during the season 1899-1900 contained as much as 25 per cent of impurities. The home markets, who could obtain rubber of a much higher quality from other sources, refused to buy the Guinea rubber, which thus remained on the hands of the merchants, who in many cases were compelled to sell at a loss. So as to improve the quality of Guinea rubber, a decree was issued in May, 1900, forbidding the sale of rubber in unopened bales. This has already had a good effect, as the natives, finding they were certain of detection, ceased adding foreign matter, but as the method of coagulating the rubber in calabashes ordinarily employed by the natives made it difficult to detect adulteration with resins, a further decree was issued to the effect that, dating from the wet season of 1901, the only rubber allowed to be exported would be that prepared by the Foulah method, in red filaments, which was found to be the only one which permitted the detection of resinous adulteration. Palm kernels were usually mixed with about 30 per cent of shell. By a decree of February 1, 1901, the exportation was prohibited if the kernels contained more than 5 per cent of foreign bodies.

CACAO-PLANTING IN SAMOA AND FIJI

is fully discussed in Australian and Fiji papers to hand, and we shall quote interesting details to embody in our *Tropical Agriculturist*. Meantime we may state that Mr. F. Harman, Manager for an English Company with a capital of £10,000 to open 500 acres in cacao, speaks well of the German Government in Samoa. He has a plantation of 1,000 acres with good soil and in five years his cacao comes into full bearing at an outlay from of £20 to £25 an acre, including buildings, &c., while the crop is then, equal to 9 cwt. an acre of dried (prepared) cocoa, selling at 8d a lb. in Sydney and giving 6d nett to the planter or £25 an acre, equal to 100 per cent! *Credat Judæus!* Leases of land are to be had at 2s to 3s per acre per annum in Samoa, Powell Bros. of Fiji, criticise Mr. Harman's figures; but with still more surprising statements. Samoan land they say is rugged with heavy timber and exceedingly difficult to work; labour will be an increasing difficulty; no crop can be grown between the young cacao; and the £20 to £25 outlay is contrasted with £12 to £15 in Trinidad; while in Fiji *crops worth £30 an acre are grown between and before the cacao bears!* Powell Bros. do not go further to tell us what the Fiji cacao crops and net returns are; but they leave us to infer they are quite as good as those of Samoa. Why, oh why then, did Ceylon planters ever give up Fiji—some after many years of a trial?! Nothing is said about hurricanes or other possible drawbacks.

TREE AND LEAF GROWTH IN CEYLON.

The following is an abstract of the paper read at the British Association, Belfast, on *Foliar Periodicity in Ceylon*, by Mr. Herbert Wright of the Gangaruwa Experimental Garden:—

The high temperature and humidity of the air in most parts of Ceylon allow almost continuous growth of the arborescent vegetation. There are, however, nearly two hundred species which become leafless at different times of the year.

External and internal factors affect the phenomena of defoliation and foliar renewal. The climatic effect is obvious from the fact that the majority of

our deciduous species become leafless during our hottest and driest months. The deciduous trees respond only to one hot dry period of three or four months, and not to the dry part of each monsoon. Some species undergo complete defoliation twice per year; others exhibit incremental foliar activity several times per year, in addition to a complete annual renewal, and many introduced species show great variation during their phase of acclimatisation. In the northern districts, where the rains of the south-west monsoon are very feeble as compared with those at Peradeniya, the defoliation is considerably delayed. The climatic conditions in Ceylon are not equable enough to allow continued development along personal lines, and botanists desiring to study the personal equation in plant life should select a more equable area.

Internal forces are, however, obviously at work, as evidenced by the following:—

(*a*) Species retain full possession of their foliage or put forth new leaves when the temperature and dryness of the air is at the maximum.

(*b*) Some species drop their leaves and remain bare during our wet, cool months, when transpiration is at the minimum.

(*c*) Plants of the same species, on the same plots, are deciduous at periods varying by many weeks and months.

(*d*) The same species may undergo defoliation at approximately the same time of the year, though under the dissimilar climates of Peradeniya, Colombo, and Mannar.

The irregularity of foliar periodicity is very pronounced. There is not a month when all the trees are in full leaf.

The foliar periodicity of the evergreens is as complex as that of the deciduous trees, the foliar renewal taking place annually, bi-annually, or weekly, all being subject to individual variations.

Complete defoliation and foliar renewal in temperate and tropical zones often results in the differentiation of rings of growth in the secondary xylem. The variation in our tropical species is so great that an exact knowledge of foliar activity must be at hand before the time-value of the rings of growth can be determined. Saplings may undergo foliar repletion in the first year, or several years may elapse before this occurs; mature plants may be characterised by annual, bi-annual, or incremental periods of leaf production; further, many trees are repeatedly defoliated by the ravages of insects, bats and fungi.

Foliar periodicity is the most potent factor in determining the number and significance of the rings of growth, but for the complete interpretation of these a further knowledge of the rate of cambial activity and the independent effect of a hot dry season is necessary.

The rate of cambial activity is of especial value in determining the varying significance if the xylem differentiations in slow-growing decduous or quick-growing evergreen trees.

JAVA AND ITS TEA SUPPLY.

Some anxiety is felt as to the future of tea in Java. So far as we can learn, planting is not extending in that island: our Dutch neighbours have learned caution by their experience both in coffee and cinchona. The former industry has been wellnigh ruined by Brazil; while the price of bark and quinine can only with great difficulty be kept up to a remunerative level, The Java Quinine Factory has helped greatly to benefit the local cinchona planters, and its capacity is to be doubled we learn. Meantime as regards tea, with the experience of India and Ceylon before them, Java tea planters are bound to be cautious and *festina lente* is their motto. Those who have tea fields or estates are trying to do the best they can by improved cultivation and manufacture; but any extensions of the area under this product will be few and far between for some years. Our latest news from Java is as follows:—"Java is just now experiencing a very severe drought. This should reduce the output of tea from that island to some extent this season."

A satisfactory feature about the Java tea enterprise is the very considerable and steadily increasing proportion of the produce which is shipped direct to Holland. This means the gradual conversion of a good many of the Dutch people to afternoon and, perhaps, morning tea. If this process continues and Belgium as well as the adjacent portion of Germany—the people of the Groningen and East Friesland provinces have always been great tea-drinkers—were induced to consume increasing quantities of Java tea, no one would regret some expansion in the Dutch planting enterprise. It is any increase in the shipments of Java tea to the London market, that Ceylon and Indian planters deprecate.

FREIGHTS AND PASSAGES TO AUSTRALIA.

CEYLON TEA PAYING 1D. A LB. IN FREIGHT!

"Tea Scrip" raises once again a very important question in his letter elsewhere. It is simply monstrous that the Ceylon tea planter should have to submit to the heavy and entirely inequitable rates of freight at present charged for his produce to Australian ports. Can it be doubted that the trade would still further expand until the Australasian market was nearly, if not, quite won over to "Ceylon's," or at any rate to British-grown teas, if only freights were at all reasonable. Surely, a remedy can be found by inviting competition with the existing steamers? We saw it mentioned the other day that the Japanese Company was to be approached with reference to running a steamer once a month right round the Australian ports. If she started from Colombo and called on her way back at Singapore, we do not think that due encouragement would be wanting. In fact in this might be found the solution of cheap passages as well as cheap freight to and from Australia. Failing a Japanese liner, we trust the Australasian S.N. Company will be enterprising enough to establish a branch line with Ceylon and India. Meantime, pending any such arrangement, the Planters' Association and Chamber of Commerce should enter a remonstrance with the existing Steamer Companies as to their high rate of freights.—The question of a closer connection between Ceylon and Western Australia is discussed in correspondence on our sixth page; but, we suspect only by securing a new and rival steamer can heap tourist passage rates be established.

Monthly Shipments of Ceylon Black Tea to All Ports in 1901-1902.

(Compiled from Chamber of Commerce Circular.)

	United Kingdom.		Russia.		Continent of Europe.		Australia.	
	1901. lb.	1902. lb.	1901. lb.	1902. lb.	1901. lb.	1902. lb.	1901. lb.	1902. lb.
January	12617540	9056013	727093	612958	104240	151934	740574	714247
February	8333266	7455219	...	919709	135811	121158	1778987	1020948
March	7932090	8198179	1288010	896513	82055	91081	2012070	1713916
April	8474940	8521388	1297873	988698	111082	93198	2245142	2081904
May	10570686	9638555	937138	238239	63310	80669	1644160	2000522
June	11425044	12563050	835711	1934976	93699	166479	1730886	1828695
July	8488409	10724781	700557	1779011	189567	108785	2593243	1747960
August	6030406	7396614	949747	1065599	82595	208894	1612929	1574498
September*	6093129	6652202	485429	795315	74896	70262	1779523	1857897
October	8989024		762616		181891		1840192	
November	6229472		1018996		190988		1539370	
December	12235867		830226		189520		990563	
Total	105,497,339		9,699,734		1,539 986		20,638,208	

	America.		All Other Ports.		Total.	
	1901. lb.	1902. lb.	1901. lb.	1902. lb.	1901. lb.	1902. lb.
January	138235	125795	275598	389215	14603250	11050212
Febuary	272221	115332	453774	385795	10974059	10018071
March	510734	566263	350874	311191	12175833	11777143
April	10030	807390	226776	290137	12365843	12782715
May	288333	242651	306644	436410	13810271	12637046
June	276827	403005	404687	714471	14766854	17660676
July	442100	464858	669163	846036	13083039	15671431
August	266787	461229	227578	678095	9170042	11384929
September	214779	563981	388213	688730	9035969	10628487
October	115545		273928		12163196	
November	504614		183124		9666564	
December	313534		366244		14875954	
Total	3,704,335		4,549.627		145,188.244	

Monthly Shipments of Ceylon Green Tea to all Ports in 1901—1902.

	United Kingdom.		Russia.		Australia.	
	1901. lb.	1902. lb.	1901. lb.	1902. lb.	1901. lb.	1902 lb.
January	...	64021	...	..	...	...
February	...	24839	..	4420	...	...
March	75583	14800	...	24210	...	..
April	13016	13676	...	8000	...	...
May	33889	70103	...	..	1714	..
June	12814	87340	..	74225	...	...
July	4478	40574	...	..	...	...
August	...	70900	..	..	...	...
September	5945	50771	...	..	...	...
October	12921		..	..	...	..
November	16540		5615	..	...	..
December	15255		38547	..	1262	..
Total	237,231		44,162	...	2,976	...

	America.		All Other Ports.		Total.	
	1901. lb.	1902. lb.	1901. lb.	1902. lb.	1901. lb.	1902. lb.
January	...	113332	..	...	...	177353
February	...	26480	...	515	..	56254
March	227889	62313	12173	100	315660	101423
April	79403	53610	7365	9165	99784	84451
May	65980	32676	1454	3280	103037	106059
June	23046	84184	...	4500	35860	250249
July	46896	194016	...	...	51374	234590
August	12260	105982	...	1600	12260	178482
September	15304	333704	...	6800	21249	391275
October	28560	..	...	..	41481	...
November	36296	..	...	...	58541	...
December	11786	...	7612	...	27011	..
Total	797,796	...	28,609	..	1,110,774	...

* It is impossible to get the figures for the last month in time for publication; but see pages 358, 359 for certain information.

SHARE LIST.

ISSUED BY THE

COLOMBO SHARE BROKERS' ASSOCIATION.

CEYLON PRODUCE COMPANIES.

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Agra Ouvah Estates Co., Ltd.	500	870	—	—
Ceylon Tea and Coconut Estates	500	..	—	—
Castlereagh Tea Co., Ltd.	100	90	—	..
Ceylon Provincial Estates Co. Ltd.	500	—	—	505
Claremont Estates Co., Ltd.	100	—	—	—
Clunes Tea Co., Ltd.	100	50	60	..
Clyde Estates Co., Ltd.	100	35	—	—
Doomoo Tea Co., of Ceylon Ltd.	100	65	—	...
Drayton Estate Co., Ltd.	100	—	..	—
Eila Tea Co., of Ceylon, Ltd.	100	30	35	32½
Estates Co of Uva, Ltd.	500	—	...	...
Gangawatte Tea Co., Ltd.	100	—	—	—
Glasgow Estate Co., Ltd.	500	950	..	1000
Great Western Tea Co., Ltd.	500	675	—	..
Hapugahalande Tea Estate Co.	200	—	—	—
High Forests Estates Co., Ltd	500	500	—	—
Do part paid	400	—	...	...
Horrekelley Estates Co Ltd	100	..	105	105
Kalutara Co., Ltd.,	500	—	200	..
Kandyan Hills Co., Ltd	100	—	40	—
Kanapediwatte Ltd.	100	—	...	—
Kelani Tea Garden Co., Ltd.	100	..	32-50	—
Kirklees Estate Co., Ltd.	100	100	120	—
Knavesmire Estates Co., Ltd.	100	...	45	—
Maha Uva Estates Co., Ltd.	500	350		—
Mocha Tea Co., of Ceylon, Ltd.	500	700	—	750
Nahavilla Estate Co., Ltd.	500	250	...	—
Neboda Tea Co., Ltd.	500	—	...	—
Palmerston Tea Co., Ltd.	500	...	400	—
Penrhos Estates Co , Ltd.	100	—	75	—
Pitakanda Tea Company	500	—	...	—
Pine Hill Estate Co., Ltd.	60	—	30	..
Putupaula Tea Co., Ltd.	100	...	..	—
Ratwatte Cocoa Co., Ltd.	500	..	...	—
Rayigam Tea Co., Ltd.	100	..	50	—
Roeberry Tea Co., Ltd.	100	—	90	85
Ruanwella Tea Co., Ltd	100	...	30	—
St. Heliers Tea Co., Ltd,	500	...	—	—
Talgaswela Tea Co., Ltd.	100	...	...	—
Do 7 per cent Prefs.	100	—	—	—
Tonacombe Estate Co., Ltd,	500	—	—	..
Union Estate Co., Ltd.	500	..	110	—
Upper Maskeliya Estates Co., Ltd.	500	550	—	—
Uvakellie Tea Co., of Ceylon, Ltd	100	70	80	—
Vogan Tea Co., Ltd.,	100	47½	50	—
Wanarajah Tea Co., Ltd.	500	..	900	—
Yataderiya Tea Co., Ltd.	100	—	—	290

CEYLON COMMERCIAL COMPANIES

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Adam's Peak Hotel Co., Ltd.	100	...	30	...
Bristol Hotel Co., Ltd.	100	..	110	—
Do 7 per cent Debts	100	107	...	..
Ceylon Gen. Steam Navigation Co., Ltd	100	—	250	—
Ceylon Ice & Cold Storage Co. Ltd.	100	—	110	—
Ceylon Superæration Ltd.	100	—	—	—
Colombo Apothecaries' Co. Ltd.	100	135	—	—
Colombo Assembly Rooms Co., Ltd.	20	15	..	..
Do prefs.	20	...	..	..
Colombo Fort Land and Building Co., Ltd.	100	80	—	85
Colombo Hotels Company	100	...	..	280
Galle Face Hotel Co., Ltd.	100	190	195	192½
Kandy Hotels Co., Ltd.	100	..	130	130
Kaluganga Nav. Co. Ltd.	60	...	60	—
Mount Lavinia Hotel Co., Ltd.	500	—	300	—
New Colombo Ice Co., Ltd.	100	—	75	—
Nuwara Eliya Hotels Co., Ltd.	30	25	27½	—
Do 7 per cent prefs,	100	—	105	—
Public Hall Co., Ltd,	20	...	—	—

LONDON COMPANIES

Company	paid. p. sh.	Buyers.	Sellers.	Transactions
Alliance Tea Co., of Ceylon, Ltd.	10	..	—	..
Anglo-Ceylon General Estates Co	100	...	55—60	—
Associated Estates Co., of Ceylon	10	..	1½—2½	—
Do. 6 per cent prefs	10	..	3—5	—
Ceylon Proprietary Co.	1	.	¼—½	..
Ceylon Tea Plantation Co., Ltd.	10	..	23¾—2[illegible]	...
Dimbula Valley Co. Ltd	5	..	5—5½	—
Do prefs	5	—	5—6	...
Eastern Produce & Estate Co. Ltd.	5	...	3¼—3¾	.
Ederapolla Tea Co., Ltd	10	...	6—8	...
Imperial Tea Estates Co., Ltd.	10	...	4 .4½	—
Kelani Valley Tea Assen., Ltd.	5	...	3-5	—
Kintyre Estates Co., Ltd.	10	...	6-8	—
Lanka Plantations Co., Ltd	10	..	4	—
Nahalma Estates Co.,Ltd.	1	...	nom	..
New Dimbula Co., Ltd.	1	...	2¾—3	..
Nuwara Eliya Tea Estate Co., Ld.	10	—	9¾	—
Ouvah Coffee Co., Ltd.	10	..	6—7	—
Bagalla Tea Estates Co., Ltd.	10	.	11-13	—
Scottish Ceylon Tea Co.,Ltd.	10	—	10—15	—
Spring Valley Tea Co., Ltd.	10	...	2—5	—
Standard Tea Co., Ltd.	6	..	10—12	..
The Shell Transport and Trading Company, Ltd.	1	...	1½—1¾	—
Ukuwella Estates Co., Ltd.	25	—	par	...
Yatiyantota Ceylon Tea Co., Ltd.	10	—	5¼	..
Do. pref. 6 o/o	10	...	9—10	...

BY ORDER OF THE COMMITTEE.

Colombo, Nov. 7th, 1902.

* Latest London Prices

RAINFALL RETURN FOR COLOMBO.

(Supplied by the Surveyor-General.)

	1897.	1898.	1899	1900	1901	Av. of 32yrs.	1902
	Inch	Inch	Inch.	Inch.	Inch.	Inch.	Inch
January ..	3·81	2·32	·98	3·72	11·91	3·51	1·95
February ..	1·68	1·98	2·78	0·63	3·55	1·94	4·67
March ..	3·66	4·21	0·88	3·71	5·12	4·76	6·85
April ..	10·97	22·81	6·66	15·12	8·71	11·34	10·01
May ..	8·30	5·80	17·73	10·63	6·28	11·86	11·89
June ..	10·14	10·94	9·23	7·83	5·93	8·28	9·84
July ..	5·24	6·15	1·11	6·77	4·52	4·46	4·63
August ..	9·09	0·97	0·62	7·35	0·46	3·68	2·78
September ..	4·58	6·90	1·48	4·00	3·93	4·91	8·18
October ...	4·71	20·60	12·99	9·47	3·91	14·03	31·47
November ..	11·66	17·38	8·58	9·25	19·84	12·77	3·11*
December ..	8·89	3·05	4·44	5·20	1·70	6·26	
Total..	82·73	103·11	73·48	83·68	75·86	87·83	95·28

* From 1st to 5th Nov. 3·11 inches, that is up to 9-30 a.m on the 6th Nov.—Ed *C.O.*

CEYLON TEA: MONTHLY SHIPMENTS TO UNITED KINGDOM AND ESTIMATE.

Estimate for	Oct.	1902—8 to 8½ mill. lb.
Total Shipments	Do	1902—7,000,000 lb.
Do Do	Do	1901—8,989,024 lb.
Do Do	Do	1900—7,316,968 lb.

[Estimate for Nov. 1902—7½ to 8 million lb.]

"Growth of Ceylon Timbers."—We are promised Mr. Herbert Wright's paper on this subject for an early issue of our Monthly. Mr. Wright reports to us:—

In my paper I have tried to lay down some general statements on the subject and to explain the probable factors which determine the number and significance of the rings of growth in our Ceylon timbers.

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

EXPORTS

Colombo, Nov. 3rd, 1902.

CARDAMOMS :—
- All round parcel, well bleached per lb. R1·20
- Do. dull medium do. R1·00
- Special assortment, 0 and 1 only do. R1·35
- Seeds do. R1·05

CINCHONA BARK :—
- Per unit of Sulphate of Quinine 7c—1½ to 3 per cent.

CINNAMON :—(in bales of 100 lbs. nett.)
- Ordinary assortment per lb. 50c. } scarce.
- Nos. 1 and 2 only per lb. 57c. }
- Nos. 3 and 4 only per lb. 45c. }

CINNAMON CHIPS :—(in bgs. of 56 lbs. nett. per candy of 560 lb.) R62·50

COCOA :—
- Finest estate red unpicked per cwt R45·00
- Medium do do do R37·50
- Bright native unpicked and undried R33·00
- Ordinary do do do R25·00

COCONUTS—(husked)
- Selected per thousand R50·00
- Ordinary „ R43·00
- Smalls „ R35·00

COCONUT CAKE—
- Poonac in robins f. o. b. per ton R80·00
- Do in bags none.

COCONUT (Desiccated).
- Assorted all grades per lb 20c.

COCONUT OIL—
- Dealers' Oil per cwt R16·00.
- Coconut Oil in ordinary packages f. o. b. per ton R355·00.—R347·50 offered and refused.

COFFEE.—
- Plantation Estate Parchment on the spot per bus. None
- Plantation Estate Coffee f. o. b. (ready) per cwt.—R62·00.
- Native Coffee, f.o.b per cwt.—None.

CITRONELLA OIL—
- Ready do per lb.—47c.—slightly firmer.

COPRA—
- Boat Copra per candy of 560 lb. R50·25
- Calpentyn Copra do do R51·50
- Cart do do do R45·50
- Estate do do do R51·00

CROTON SEED per cwt—R11·00

EBONY—
- Sound per ton at Govt. depot—none.
- Inferior R70·00.—Sales of the 13th Oct. Sound quality not sold. Next sale 1st De .

FIBRES—

Coconut Bristle	No. 1	per cwt	None
Do	„ 2		None
Do mattress	„ 1		None
Do	„ 2		None
Coir Yarn, Kogalla	„ 1 to 8		R15·00
Do Colombo	„ 1 to 8		R11·00
Kitool all sizes			None
Palmyrah			None

PEPPER—Black per lb None

PLUMBAGO—

Large lumps	per ton	R600
Ordinary lumps	do	R600
Chips	do	R350
Dust	do	R250 Prices nominal Fine qualities scarce.
Do (Flying)	do	R125

SAPANWOOD— per ton R45.—Nominal.

SATINWOOD (ordinary) per cubic ft. R4·00 } Sales of the
Do (Flowered) per cubic ft. R11·10 } 13th Oct.

TEA—	High Grown Average	Medium Average.	Low Grown Average.
Broken Pekoe and Broken	cts	cts	cts
Orange Pekoe per lb	56	46	35
Orange Pekoe do	49	40	32
Pekoe do	41	32	25
Pekoe Souchong do	38	28	23
Pekoe Fannings do	39	29	22
Broken mixed—dust, &c	28	23	19

CEYLON EXPORTS AND DISTRIBUTION FOR SEASONS 1901 AND 1902.

COUNTRIES	Black Tea 1902 lbs.	Black Tea 1901 lbs.	Green Tea. 1902 lbs.	Green Tea. 1901 lbs.	Coffee—cwts. Plantation	Coffee—cwts. N'tive	Coffee—cwts. Total	Cocoa cwts.	C'moms lbs.	Cinnamon Bales. lbs.	Cinnamon Chips. lbs.	Coconut Oil. 1902 cwt	Coconut Oil. 1901 cwts	Copra cwts.	Desiccated Coconut lb.	Poonac. cwts.	Coconuts. No.	Plumbago. 1902 cwts	Plumbago. 1901 cwts.
To U K. ..	85898578	86101773	554570	156549	6910	..	6919	27726	305501	310192	140964	224293	190868	12908	7555338	21	8606288	110699	167430
„ Austria ..	36808	47151	..	..	1	..	1	...	...	5600	38640	12665	7249	6563	123800	...	8510	...	..
„ Belgium ..	54325	14516	...	..	143	..	143	497	50	99800	171785	3408	3752	20914	281370	82723	19032	12939	16434
„ France ..	180819	223603	...	..	4	...	4	800	448	48000	33680	238	602	90706	28000	....	56020	1414	395
„ Germany ..	496609	448194	...	..	26	..	26	3662	92848	723939	483073	12146	9534	139752	1689415	104457	981095	54631	41003
„ Holland ...	4514	18494	...	..	...	..	..	..	..	47000	197400	..	3716	470	273370	..	5000	1155	202
„ Italy ..	16434	11218		..	...	..	..	32	435	198958	172200	2424	7004	...	...	10	11285	7	100
„ Russia ..	10376411	7760512	106435	..	8	...	8	100	448	130	..	181	134	33136	..	..	...	1673	3713
„ Spain ..	3281	...	..	..	...	..	..	31	..	257402	91553	..	..	...	23750	..	...	..	...
„ Sweden ..	67438	40143	...	..	..	..	..	400	...	..	..	1129	199	...	54930	..	15120	433	204
„ Turkey ..	30608	35102	..		...	...	..	..	..	112	...	...	...	..	...	...	..	..	...
India ...	735966	1010048	25731	16124	84	...	84	7	86018	..	2296	59930	112285	5	1950	....	149500	1856	503
„ Australia ..	16141308	18108275	..	1714	1938	14	1952	514	...	4174	30888	5	168	...	674360	221	1944	267	411
„ America ...	3968002	2121333	1110085	488544	820	...	820	7	7039	318500	6275	78969	14030	...	1758525	...	99100	205614	132035
„ Africa ..	405472	289511	1200	..	15	..	15	..	2726	..	..	218	76	..	55960	1	991881	..	...
„ China ...	3830380	2533200	...	4853	42	..	42	100	7245	10200	112	545	1114	..	1918	..	–	797	..
„ Singapore ...	161947	115302	...	...	1	...	1	5250	2240	...	..	474	3106	...	..	...	...	...	...
„ Mauritius .	51819	44126	..	...	280	..	230	..	..	..	..	...	..	...	..	..	..	..	..
„ Malta ..	265486	268308	..	...	...	...	..	...	..	...	..	..	..	..	...	..	..	...	..
Total export from 1st Jan to 3rd Nov, 1902	122816355	119250869	1798021	667784	16231	14	10295	39126	504993	2039007	1318869	390631	353737	301290	12513692	187433	11116063	391490	362453

MARKET RATES FOR OLD AND NEW PRODUCTS.

(From Lewis & Peat's Fortnightly Price Current, London, October, 1902.)

☞ No Price Current having reached us in time for this issue, we omit the usual quotations and fill up the page with ordinary matter.

FIXATION OF NITROGEN BY ALGÆ.

When we expose pots of sand to which phosphates, potash, and magnesium salts have been added, to the usual soil of a garden, we soon find that they get covered with various green algæ; and if we chemically analyse the surface of the sand, we often find a considerable amount of nitrogen, rising sometimes to as much as 0·08 per cent.

Messrs. Schloesing, jun., and Laurent observed the fixation of nitrogen by algæ in experiments, in which they noticed the diminution in volume of this element in a confined atmosphere, even in the presence of Leguminous plants, if the sand were covered with green algæ. Later, M Kossowitsch has reported that this fixation of nitrogen from the atmosphere by the algæ only took place when these were associated with bacteria. M Bouilhac found by exact experiments that the algœ, Nostoc punctiforme, sown in a sterilised mineral solution without a supply of nitrogen, does not develop, but that it is otherwise when this algœ is associated with soil bacteria; this fact has been observed at Rothamsted. M Stoklasa often got vigorous blue Luins growing in sand, and yet bearing no nodules on their roots. M. Denoussy also observed the same fact, but only when the pots of sand had been invaded by algæ, and especially by certain species, which avoid full daylight, by retiring below the surface of the sand. It must, however, be recognised that though it is easy to observe the various algæ which cover the sand, and to note that that the sand has gained nitrogen, it is much more difficult to see the bacteria presumably associated with the algæ. To sum up the subject, it is perfectly established that Leguminous plants bear bacterial nodules on their roots, and fix free and uncombined nitrogen from the atmosphere. This is a point gained, and it explains the name of ameliorant plants, by which they have long been designated. The question may be asked: Are these the only plants which have this power? Do the Algœ equally possess it? Can the lower plants get possession of atmospheric nitrogen only as far as they are associated with bacteria organisms? These points further investigations have to prove.

The above facts have been summarised from Prof. Deherain's second edition of his "Traite de Chimie Agricole, 1902. J J Willis, Harpenden. —*Gardeners' Chronicle.*

GUTTA-PERCHA AND RUBBER IN GERMAN NEW GUINEA.

The gutta-percha from gutta-percha trees which Mr R Schlechter discovered on his expedition to the South Sea in the Finistere and Bismarck mountains of German New Guinea, as medtioned in our issue August 4th, has now been put to a test. All have come to the conclusion that it is a good medium gutta suitable for cable purposes, and similar to the Kelantan or hard white gutta-percha. Its loss through washing amounts only to fourteen per cent. It contains fifty-six to seventy-four per cent gutta-percha, and thirty-four to thirty-seven per cent resin, and has been estimated at about 6s, and even 8s to 10s per kilo. The rubber samples from the same district have been tested and the sample of Ficus elastica has been found equal to a superior African of 5s 3d to 5s 9d per kilo in value. The rubber from Castilloa elastica proved to be similar in quality to good Peruvian balls, and had a value about 6s per kilo. The Hevea brasiliensis rubber showed a very good quality, similar to the Para rubber which now comes from Ceylon. This Para rubber on account of its dryness and light colour, is much in demand and fetches ten per cent more than actual Para rubber.—"Tropenpflanzer."—*India-Rubber Trades' Journal*, Sept. 1.

RUBBER YIELD OF GERMAN AFRICA.

The official reports on the German Colonies in Africa devote special attention to the development of their India-rubber resources, though the results in this direction have not yet proved so successful as was at one time anticipated. For one reason, as a recent report on Kamerun expresses it: "In consequence of the falling off of the supply of rubber and ivory in those parts of the country from which they have hitherto been obtained, it is only by the opening up of fresh districts that the trade can be kept up to its present standard." Still rubber and ivory continue to furnish the larger part of the exports from Kamerun, Togo, and German East Africa, and now and then, for a while, an increased yield is obtained. Meanwhile the Government is seeking to encourage the forming of rubber plantations, as well as to discourage the destruction of native rubber plants. According to a British report on recent trade in these German colonies, the value of the rubber exports were as follows:

Kamerum—£94,893 in 1899-1900; £102,926 in 1900-1901—the increase being due to higher prices realized.

Togo—£18,304 in 1899-1900; £26,068 in 1900-1901—more rubber having been gathered.

East Africa—£66,859 in 1899; £52,933 in 1900—exports having declined in volume.

From these figures it would appear that the average production of India-rubber in German Africa during the five years covered by the latest available statistics has been 1,757,414 pounds.

The imports of crude rubber into Germany from her African colonies, during five years past, have been:

		Togo and Kamerun.	East Africa.	Total.
1897	... *pounds*	744,700	167,200	911,900
1898	... ..	698,280	70,180	768,460
1899	... ..	1,111,800	140,800	1,252 600
1900	... ...	902,000	100,980	1,002,980
1901	... ...	847,800	120,340	968,140

The yearly average deduced from this table is 980,816 pounds, indicating that the mother country fails to profit from the handling of an important share of the rubber produced in her colonies.=During the same five years Great Britain imported rubber direct from Togo and Kamerun as follows:

	1897.	1898.	1899.	1900.	1901.
Pounds ..	152,208	177,632	156,688	146.944	147,728

In addition to the various native rubber species in German Africa, several imported species promise good results, and the experiments made in planting, under expert scientific supervision, seem likely to be of benefit to the cause of rubber culture generally.—*India Rubber World*, Sept. 1.

THE

AGRICULTURAL MAGAZINE,

COLOMBO.

Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for November :—

Vol. XIV.] NOVEMBER, 1902. [No. 5.

SCHOOL GARDENS.

EVERY new movement experiences a period during which it is the subject of suspicion, and even of contempt. "Qui bono"? is the question that is uppermost in the mind of those who are not directly interested in it, and to give them a satisfactory reply is well-nigh impossible.

One of the greatest drawbacks in the connection with the establishing of School Gardens is the want of sympathy that is exhibited by those whose co-operation is as much to be desired as it was counted upon. But in place of sympathy and help there is often a supercilious curiosity, indicated by such a question as "What are you doing"? as though the answer could be given in a word!

Now for the benefit of those who honestly would be informed, we shall endeavour to clearly state the case for the School Garden scheme, enumerating its objects under different heads. (1). We will take what some may smilingly term the æsthetic side of School gardening. We will accept the description, and add that one of the objects of the scheme is certainly to make the surroundings of school children congenial and pleasant to them. The bare hard walls and dreary surroundings of a school are far from inviting to a child. There is nothing to attract, nothing to brighten up the place, nothing to relieve the eye of the little scholar—in fact nothing suggestive to look upon, but everything impenetrable and irresponsive, and acting as a counterfoil to the lively intelligence and curiosity of the child-mind. Now, is it fair to the child that such should be the case, that, so far from providing "natural" food for the hungry mind to feed upon, we should endeavour to dull the edge of curiosity, which, so to speak, is the spur that impels him to the acquisition of knowledge? On the other hand it is our duty to provide all that is cheering and suggestive and calculated to preserve and cultivate the natural bouyancy of heart. In many cases we find children drawn (oftener driven) from their bright and healthy surroundings to be immured within the dismal walls of a school-room, their elastic minds compressed and forced to dwell for hours together on the dull routine of class work and their own educational sevitude. It is here that the new scheme comes in, to lighten the burden of the scholar by keeping him from dwelling on the *drudgery* and making him think only of the *pleasure* of work. For it cannot be denied that it is environment and association that to a great extent control mental exercise and establish mental conditions; and it should be the object of all those who have the oversight of children to furnish their receptive minds with such associations of ideas as will in after life make them cheerful and hopeful individuals, ready to look on the bright side of the picture, and not drepressed and depressing, always taking a gloomy view of life.

Those who have seen school children in a garden will understand the degree of pleasure they derive from it. When the town child find himself among foliage and flowers he is not less delighted than a caged bird that has been released. Beauty, colour, variety, sweet odours, all these attributes are elements of pleasure to him, while arrangement, form, symmetry, order, neatness, all these qualities are bound to react on the mind, and, bearing fruit, establish such ideals and resolutions as we all hope for in our children.

(To be continued.)

OCCASIONAL NOTES.

To those who have been enquiring for the price of chillies in the London market we would state that the London *Grocer* quotes Zanzibar chillies at from 34 to 37 shillings per cwt. "Capsicums" range from 16 to 80 shillings per cwt.; "long peppers" 55 to 58 shillings per cwt.

The rainfall for October as recorded by us will give some idea of the nature of the weather last month. Our own measurements reached a total of 38·27 inches against 31·47 in the Fort the two places being within a distance of 3 miles from each other. Rain fell on all but two of the 31 days, and the heaviest fall was measured on 1st November, viz., 5·43 in. This is certainly very unusual, and some people are speculating whether there is any connection between the heavy rains and the comet of Perrine!

Cannabis sativa (Indian Hemp), is according to a co-respondent pretty commonly found growrng around dwelling houses in the Balangoda district, but only in small enough numbers not to attract attention, as the general impression is that the cultivation of the shrub is prohibited. The plant is allowed to wither *in situ*, and is then further dried and sold to the Moorman "Cadger."

On this subject the *Ceylon Observer* says:—We do not think there is any Ordinance at present in the local list prohibiting the cultivation of Indian hemp, any more than of the poppy; because in deference to the Buddhist prohibition of such drugs, nothing has ever been done in Ceylon worth notice in this direction. But it will certainly become necessary now, in view of what our correspondent states, to pass such a law guarding the cultivation. Very possibly under the Opium or Bhang Ordinance any one turning the hemp or poppy into drugs for personal use or sale, can be punished.

NEW FODDERS.

Sorghum halapense, now known as *Andropogon halapensis*, and from which the widely-cultivated cereal *A. Sorghum* (Karal-iringu, S.) is supposed to be descended, has been more than once put forward as a good fodder. The grass is sometimes referred to as "Johnson grass," and it is curious to find people anxious to grow plants with a strange name, when they would never think of taking up some of the indigenous forms of vegetation and endeavouring to improve them. Such people were naturally disappointed to find that the far-famed Cow-pea was almost identical with the native beans known in Sinhalese as "Li-me" and "Nil-me"; and that the Florida velvet bean was of the same genus and species as the Tamil "Achariyapala."

Johnson grass, as we have indicated above, is a grass "not uncommon" as Thwaites puts it, in the Central Province of Ceylon, and probably seen every day by the inhabitants who, however, do not connect it with the *Sorghum halapense* of Botanists or the Johnson grass of America.

A correspondent writing to the *Agricultural Journal* of the Cape, refers to information received by him as to "Johnson grass" making excellent grazing, and states that the seed can be sown on the dry ground and within a short time will grow most luxuriantly.

Mr. P. MacOwan, the Government Botanist at the Cape, writes:—"*Sorghum halapense*, the grass to which the Americans have given the absurd name of 'Johnson grass,' is one of the fodders or supposed fodders, like 'Teosinte' and 'Wagner's pea introduced by speculative seedsmen, and praised far beyond their worth, just to make sales and rake in the money." He then quotes the experience of a N. S. W. farmer to this affect: "It is of no use as a fodder in this district. It is of no value and is a great trouble to get rid of after we once get it to grow, and all who have sowed it wish they have never seen the thing. No one who ever saw the Johnson grass growing would have anything to do with it. It grows very coarse and tall, and very hard. No cattle will eat it while there are any other kinds of grass." It is said to grow wild along the banks of the Orange River and other parts, much as the common reed does, but is not sought after by cattle

Mr. MacOwan recommends *Pentzia virgata* as a wholesome and fattening fodder for the Karoo, where conditions do not admit of a regular grass crop, though, as he states, the food value of the veldt depends upon dwarf bushes whchgrow socially and with alternate use and rest prove a stand-by in all seasons.

RAINFALL TAKEN AT THE SCHOOL OF AGRICULTURE DURING THE MONTH OF OCTOBER, 1902.

1	Wednesday ..	·03	17	Friday ...	·14
2	Thursday ...	·05	18	Saturday ..	·04
3	Friday ...	·85	19	Sunday ...	1·90
4	Saturday ..	5·08	20	Monday ...	Nil
5	Sunday ..	2·78	21	Tuesday ...	Nil
6	Monday ...	·80	22	Wednesday	1·45
7	Tuesday ...	·63	23	Thursday ...	·36
8	Wednesday ...	4·55	24	Friday ...	·60
9	Thursday ...	·95	25	Saturday ..	·75
10	Friday ...	2·15	26	Sunday ..	·26
11	Saturday ..	2·18	27	Monday ...	·04
12	Sunday ...	·40	28	Tuesday ...	·64
13	Monday ..	2·07	29	Wednesday ..	·02
14	Tuesday ..	·02	30	Thursday ...	1·24
15	Wednesday ...	.95	31	Friday ..	1·32
16	Thursday ..	·62	1	Saturday ...	5·43

Total...38·27
Mean...1·23

Greatest amount of rainfall registered in 24 hours, on the 1st November 1902, 5·43 inches.

Recorded by Alex. Perera.

COTTON CULTIVATION.

[Just now when Cotton is being spoken of as one of the likely crops for the large tracts of waste land in the North-Central Province that will be made accessible by the Northern Railway, the following account of Cotton Cultivation, based on experience in Queensland, should prove of considerable interest to many. The author is Mr. Daniel Jones of the Queensland Department of Agriculture, and we take over the paper from the *Agricultural Journal* of that colony.—Ed. *A.M.*]

One important factor proved by our local experience and emphasised by scientific investigation in other countries where this crop is largely grown is, that this crop is about the least exhaustive to the soil of any we are acquainted with. Local experience has shown that the richest soils should not be chosen for this crop. Many errors were in this way committed in past years. The less fertile areas would have been far more suited to the cotton plant. Undoubtedly, at times, cotton will need fertilising. This, however, need not concern the planter at the outset of his operations, unless he farms very poor soil, which in Queensland is not very probable.

It will be well for the planter to keep this fact in mind, and not concern himself at first so much about the fertility of the soil as thorough cultivation of that which he crops.

In our past experience we always found that the rich land forced the plant so much to wood that not only was the yield meagre, but the quantity of resulting foliage and wood much retarded picking. This especially was the case in wet seasons, but, on the other hand, in seasons of sparse rainfall, the trouble was not so acute. An illustration of this is seen in this season's experiment at the Acclimatisation Society's plot at Bowen Park, where the dry conditions have so retarded the growth that little difference is noted between plants of very robust growth, such as Sea Island and Egyptian, as compared with the more modest growth of the Upland variety, which, despite the unparalleled dry season, has returned a very fair crop of cotton.

Cotton has always been regarded in Queensland as a dry-season crop. Its vitality under drought conditions is well recognised. The climatic influence most adversely affecting this crop is excessive wet, and to this cause the major part of our losses in the sixties and seventies, when cotton was largely grown, is to be attributed. The cycle seems to have now alternated to the other extreme for some years past; hence the risk from this cause need not, in the southern part of the colony, be so much feared.

The Varieties to Plant

Will much depend on climatic conditions, and as far as many parts of the State are concerned must be, for some time, experimental. In the south, experience thus far has demonstrated that the Upland variety is the best suited to our region.

In the North, probably the longer-stapled varieties, such as Sea Island and Egyptain, will be grown. These three species, differing as they do in texture and length of fibre and value, appear to have become so blended and intercrossed as to almost conceal the original distinctive features of each species. Broadly speaking, we distinguish Sea Island by the clean black seed and extra long fibre; the Egyptian by its shorter fibre and brown or sometimes pale-green seed with the lint adhering somewhat. The Upland variety is the shortest staple with a grey seed, but is sometimes black in such varieties as the Okra, the fibre adhering closely to it.

An American authority expresses the opinion that the Upland cotton is a hybrid produced by blending the properties of several species under the cultivation of a long series of years. All who know American practice are well aware of the importance cotton-growers attach to such experiments, and we in Queensland can note the advance in quality of cotton grown to-day by comparison of that produced here thirty years ago. The species mentioned as growing in the cotton belt of the United States are given as *Gossypium herbaceum*, L.; *G. roseum*, Tod.; *G. nankin*, Mey.; *G. mexicanum*, Tod.; *G. maritimum*, Tod.; *G. hirsatum*, Mil.; *G. barbadense*, Lin.; *G. herbaceum*, the short-stapled variety, is the plant most favoured for cultivation, by reason of its more prolific yield and adaptation to regions where the Sea Island and Egyptain varieties from climatic causes do not prove profitable. So hardy is this plant that its cultivation is of the simplest; more especially is this observed in the Central and North Queensland coastal districts, where it grows uncared for once the seed is sown. The difference in growth of the shrub easily distinguishes the Upland from the other two varieties, the former being much more dwarfed than the others. Sea Island and Egyptain bushes often attain the height of 10 or 12 feet, and make spreading bushes. The Upland confines itself to a modest 4 or 5 feet bush, at the same time developing a denser foliage than the other sorts. This dwarf habit lends itself as more favourable both in regard to tillage operations as well as to the removal of the crop.

In the Central and Northern coastal districts, the Egyptian and Sea Island sorts, in conjunction with the Upland varieties, might well be tried. The specimens which I have seen growing in our Northern districts give no room to doubt but that the long-stapled sorts will do well as far as growth is concerned. The excessive rainfall in these areas will somewhat militate against achieving the best success; and the question resolves itself into the experiment of ascertaining if, by planting the crop at favourable periods, the ripening stage may be carried beyond the rainy season. In the event of this being practicable, there should be no apprehension as to successful cotton cultivation in our Northern regions. Thus far our practical knowledge of districts suitable for this crop is as yet but very meagre. Save for a few isolated

patches on the Darling Downs, a few experimental plots North and West, from which I have at various times received fair samples of cotton, Queensland, with the exception of the East and West Moreton districts, represents untried localities. There is every reason to believe that in the interior and drier parts this shurb will thrive, more especially as its drought-resisting qualities surpass most crops in ordinary cultivation. In deciding on varieties to plant, the planter must be guided somewhat by climatic influences. Long-stapled varieties do better in the Northern and more humid parts, and the short-stapled varieties do better in Southern and Western areas,

PREPARATION OF THE SOIL.

The cotton shrub being a plant depending a great deal on its tap root, which observers will note is the first prominent indication of vitality in the newly bursting seed, moderately deep tillage becomes necessary in order to get the best results. Of course, if grown in a deep, friable soil, so vigorous is the root extension of the shrub that in the short space of a few weeks the tap root penetrates to a depth much beyond the depth usually ploughed. This is undoubtedly one reason why the shrub is able so well to sustain the drought conditions often prevailing. This deep tillage is an advantage; nevertheless, this aspect in past practice did not receive more attention with our local cotton-growers than was usually given to mazie or other crops.

The best that was done was to plough about 5 to 6 inches deep, harrow thoroughly and drill, sow the seed, keep the crop clean; and, under even this superficial system of cultivation, the crop throve and yielded well. It is not to be expected that the intending planter can gain complete success by a system of indifferent tillage. So much depends on this feature with respect to yield, quality of fibre, condition of the lint as regards absence or presence of dirt in the form of weed seeds, vegetable matter, soil, &c., that the margin of profit is often materially affected thereby. Thorough tillage means financial advantage, and this must be borne in mind by the intending cotton-grower.

The main essentials, then, in preparing the soil are moderately deep ploughing—cross ploughing also, if necessary; thorough harrowing, to have proper pulverisation and a good seed bed free from lumps, so that the young plant shall be in no danger of the harrow or scuffler rolling on its little crown a mass of soil to its detriment.

These few hints are to the practical farmer scarcely necessary, but perhaps may be of some use as brief reminders to those who are new to the pursuit, and who will need to give attention to them.

SELECTION OF SEEDS.

The question of selection of seed is, for the present, one that until opportunities arise must to some extent remain in abeyance. Excepting a amall supply, in the hands of the Acclimatisation Society, of the Upland, Sea Island, and Egyptian varieties, true to name and all of the best sorts, there is no seed in the State available for distribution, save some Upland variety of mixed but good sorts at the Ipswich Cotton Factory, which has been kindly placed at the disposal of this Department for distribution. Some of this seed, I may say, I have grown this season, and although it is now some five or six years old, about 50 per cent. appears, by experiments carried on by myself and the Actlimatisation Society, to be fertile seed. Thus, in order to supply the numerous demands made upon this Department, it is proposed in the absence of fresher seed to make distribution of what is available, notifying recipients of the need of allowing for about 50 per cent. of the seed as likely to be unfertile. This simply means sowing double the quantity than would otherwise be needed. Of course those fortunate enough to obtain seed from the Acclimatisation Society, who can only distribute in small quantities, will find that all their seed is fertile, and cau sow sparingly.

In general practice, selection of seed is the result of observing and marking off the most prolific and largest podding plants in the field. In selecting, attention should be given to length of staple, texture of lint, strength of fibre, habit of growth, and other features that commend themselves to the planter. Selection in this manner gives the planter good seed for the succeeding sowing, and tends to the evolution of a better cotton plant having the prime points of advantage I have mentioned.

It is recognised that a difficulty often exists in tracing the origin of most of our varieties of cotton. The plant hybridises readily without human aid, and probably the interchange of seed from remote countries so varies the character of the shrub and its staple, causing the recognition of the original very hard to decipher. Most probably we are indebted to the good offices of our insect friends, by reason of their wonderful service as hybridisers in consonance with natura law, for the origin of many of our best varieties of cotton. The cotton-planter will do well to keep this point in view, and make selection of seed from such plauts as appear to him to have had the benefit of cross-fertilisation and exhibit good qualities.

The kinds of cotton introduced some years since by the State Department of Agriculture, and which in mixed varieties will be distributed this season, are all of them good species of Upland cotton. Our experience of these fibres in manufacture in the Ipswich mill, and our knowledge of their suitability for plantation purposes in South Queensland, is such that we can recommend them as being varieties worthy of cultivation.

One imoprtant point in the selection of seed should not be overlooked—and that is the question of proportion of seed to lint after undergoing the ginning process. When the variety is characterised by large heavy seed and the lint adheres in unduly large quantity, it is wise to discard the same for a variety that does not carry these demerits. Cotton from which the lint can be cleanly removed, and of which the seed small, will be the most profitable for

farmer and merchant. A good variety of Upland, having the merit of small seed and easy and cleanly separation from the lint, will usually yield 300 lb. clean fibre to the 1,000 lb. of unginned cotton. When the ratio of lint to seed goes below that stated, it is time for the planter to seek better varieties. Good varieties grown in West Moreton of the Upland sorts during the period of the cotton company's activity, and which can be recommended, were—Okra, Southern Hope, Jeff Welborn's Pet, Peerless, Jones' Improved, Elsworts' Truitt's Improved, Champion Cluster, Hawkins' Improved.

Sowing the Seed.

Presuming the farmer has his soil in good tilth for his planting operations, his next duty is, in the absence of a properly constructed cotton drill and planter—an implement, unfortunately, as yet not obtainable in Queensland—to sow the seed by hand. He will use a light plough to strike out his drills either by means of guiding poles or with the more expeditious land marker, and care must be taken to have the drills uniform in depth and width, as each operation materially facilitates the subsequent cultivation of the crop. The usual plan adopted is to draw drills about 4 feet apart, 3 inches deep, dropping the seed by hand at such distances as to finally leave a stand of plants 2 feet or 3 feet apart in the drills. When seed is plentiful, it is prudent to sow thickly, and later on thin out the plants to the spaces mentioned. In poor soils, the lesser distance may be settled on, and in richer soils the wider space may be adopted or exceeded as experience of the fertility of the soil may suggest.

Frequently crickets and beetles make havoc among the young plants, destroying numbers while in the succulent tender stage of growth. It is, therefore, not prudent to finally thin out the plants to their standard distances until all danger from this quarter is past.

The seed is sown sometimes after soaking in water for twenty-four hours or so, and this is one advantage when the seed is old or when planting is intended in the absence of sufficient soil moisture, as sometimes happens in planting large areas when the land is quickly drying up. Generally, the seed is sown in the dry state and covered in, awaiting the rainfall. This is, of course, attended with some risk, as in the event of a partial rainfall sufficient moisture may be unavailable to bring the plant above soil, and the germinating seed may perish. This is a contingency that must be faced in all cultural pursuits, and is not common alone to this crop. It certainly is more trouble to sow in wet soil, but, on the other hand, when the areas are small and supply of seed a consideration, this system will probably be the safest. The seed can be covered in the drills either by harrowing, or, perferably, by removing the front and hind tines of the scuffler, and working the soil into the drill by running this implement up the furrows. This gives good cover, and proves better tillage, and at the same time checks the germination of grass and weeds much better than the harrow does. It must not be forgotten that young cotton plants cannot stand the struggle for existence with weeds, and it is better to safeguard the plant in this way than have it succumb by reason of the struggle with pests and grasses. The number of plants per acre, calculating on distances of 4 feet by 3 feet, is 3,630; on the basis of 4 feet by 2 feet 6 inches, the number is 4,356.

Theoretically, 1 lb. of seed should be about sufficient for oneacre. About 300 seeds weigh 1 oz. I merely wish to mention this fact in view of the scarcity of seed now available, and to indicate a method of sowing without waste. As in all probability the demand for seed this season will exceed the supply, intending planters are advised that by steeping the seed for twenty-four hours or so, and sowing by hand in wet soil, making allowance of about half for unfertile seed (if from the Ipswich stock, if from other sources this contingency need not be taken into account), a way is demonstrated of meeting the exigencies of the case. Sowing should be completed during October in the southern part of the State—early in the month is preferable, because the plants thus have a longer growing period, and thus the crop is increased. Cotton is a child of the sun; thus as soon as warmth appears in soil and atmosphere the crop will assert itself.

In our own practice our standard distances were frequently settled for some soils as close as 18 inches to 2 feet apart. This, of course, involves the use of much more seed, and is a question for the planter to determine for himself. American growers, I may state, endorse the system of planting at much the same distances as here indicated. Cotton sown under general conditions as regards moisture and warmth will appear above ground in from three to five days after sowing. Care must be observed that the seed is not buried too deep, 2 to 3 inches being the limit of depth at which it is tadvisable to sow.

BY HIGHWAYS AND HEDGES.

Some time ago we referred to the provision made for a "wet day" by the villagers in the Salpiti Korale, who preserve the pulp (as well as the seeds) of the jak by boiling and sun-drying. In the Anuradhapura district we found the people collecting the small variety of mushroom, which at certain seasons springs up in hordes in tank beds, and preserving them in the same way for future use.

There is a great deal written now-a-days about cattle fodders, especially for dry districts, where it is recommended that the leaves of suitable trees (whose deep roots render them safe against drought) should be depended upon rather than the herbage of shallow-rooted grasses. In this connection such plants as Erabedu (*Erythina indica*) and dhall (*Cajanus indicus*, Ratathora S.), and even the jak should nct be lost sight of. In the Balangoda district it is a common sight to see cattle making a good meal of lantana flowers, while *Mimosa pudica* constitutes an alternative diet. In the N.C.P. "tora" (cassia) takes the place of the latter (which is an un-

common weed), and "tora" seedlings are to be found springing up naturally from seed-beds of cattle dung, strikingly showing how seeds are disseminated after passing through the alimentary canal of animals.

Speaking of fodder plants we might mention that the Algaroba bean described in the *Agriculture Magazine* for June, 1901, is now fully established in the Colombo Stock Garden, and as it is easily propagated by cuttings there should be no difficulty in multiplying a tree specially recommended for drought-stricken districts.

The excessive dryness of the North-Central Province is said to render the destruction of trees by burning very easy. By lighting a fire round the foot the trees are slowly incinerated, even it is stated during showery weather, when the wood is consumed underneath the bark.

Another condition due no doubt to excessive dryness, is the hollowness of the trunks of trees of any age. The hollow stems of large tamarind trees—and they are much larger than in other parts—which mark the sites of old villages form a convenient harbour for snakes.

Many of the wild forms of vegetation in the Anuradhapura district have bright showy blossoms. Chief among these are *Memecylon umbellatum* which bears what Trimen calls "brilliant bosses of (blue) flowers along the entire length of the branches," *Cassia margniata*, and species of *Bauhinia*.

The hop and honeysuckle are generally cited as examples of plants that twine from right to left. Indigenous species which have the same property are *Limacia cuspida* and *Dioscorea pentaphylla*.

In the "Buried Cities of Ceylon" mention is made of the viscid juice obtained from a tree, used with lime and coconut water for producing a polished surface on masonry work. The name of this tree is given as "para" (*Dillena dentata*). The popular name is apt to be confused with the rubber tree known as such, while the word *Dillena* is evidently a misprint for *Dillenia*. According to revised nomenclature the botanical name of the tree should be *Wormia triquetra*, while the native name correctly written is "Diya-para."

We all know the green rose, which might be looked upon as an abortion of a flower; but the latest novelty is the blue-rose which has been sent to Kew Gardens from the United States. The plant is said to have reached with blooms in excellent condition, and it is thought will claim rank with the choicest new orchid.

NATURE STUDY LESSONS.

SECOND COURSE IN THE STUDY OF PLANT LIFE.

2. THE ROOT.

The roots of plants are generally spoken of as the organs of nutrition, because it is by means of the roots that plants take up the food they obtain from the soil.

We must first distinguish the actual feeding roots from others. In a large tree, the bigger roots have lost the power of absorbing water (with plant food in solution) from the soil. They indeed *collect* nothing, and their chief duty is to fix the tree firmly to the ground, and to *convey* liquid matter through their woody tissue which is similar to that of the stem, about which we have already learnt something.

The roots which actually take part in the absorption of plant food from the soil are the *most delicate* roots, and absorption is confined to that part of each feeding root which is situated behind the extreme end. This absorptive region is covered with fine root-hairs—generally very closely packed together and so greatly increasing the absorbing surface.

In time this delicate part becomes discoloured and hardened, the root-hairs drop off, and the power of absorption is lost. But before that the rootlet has pushed into the soil and fresh hairs have formed on the new-formed length behind the root tip. And this process goes on on all healthy roots which, so to speak, travel in search of food.

To prove to yourself what you have been told, you should carefully—*very carefully*—raise a small plant or seedling of any kind with all the adhering earth, and gently place it in a basin of water till all the particles of earth attached to the roots are detached. If no injury to the delicate parts of the roots has taken place, you will be able to observe the root-hairs I have spoken of, and their situation on the roots.

You will now have some idea of the apparatus for absorbing plant food from the soil and how delicate it is; and you will no doubt begin to think a little of how we could best protect these delicate structures upon which the health and vigour of the plant so much depends, as well as how we could help them in their work of providing nutriment for the plant. But about these matters I shall have to tell you something when we come to speak of the soil.

The actual tip of the root that penetrates the earth will be found to be protected by a "root-cap" (which is constantly being renewed from within); so that each delicate root has, so to speak, a boring instrument at its end to burrow out a passage for it through the soil. You should try and make out these 'caps' at the end of roots. A magnifying glass will help you to do this. If you have the screw-pine (Wetakeyiya) growing anywhere near, examine the ends of the roots—even those above ground—and you will probably be able to see the root-caps on them.

But what is the nature of a root-hair? It is a hollow structure—a tube, so to speak, of the smallest capacity—and communicates with one of the cells of the root wall and so with the whole plant itself.

Now, I think, you have a fair idea of the way in which the roots perform their functions as nutritive organs. They do so, as it were, by innumerable minute mouths which drink in liquid food and pass it on from cell to cell, and so the fluid is transmitted upwards through the longer and larger roots on to the stem itself to be borne through its branches to the leaves.

But how, you will ask, does the plant get all its food in a liquid form—for I believe you know already that it is only liquid matter or solutions that can enter the cells, and hence that the various elements of plant food must be first dissolved before they can be available to the plants. Well, for the present it is sufficient for you to know that this dissolving out of plant food from the mass of soil is effected by water aided by certain agents in the soil as well as in the root hairs themselves. These solutions of plant food constitute the crude-sap to which we have already referred.

The larger roots may therefore be looked upon as merely continuations of the stem; these divide and subdivide into finer branches till we finally find them as delicate rootlets carrying the threadlike tubes we spoke of as root-hairs—the true absorbing media of plant food. Roots are produced under various conditions:—

1. *By the Germination of Seeds.*—Dig up germinating seeds of beans and Indian corn (or paddy) and observe the production of the roots. Notice that in the bean a main or tap-root will be first produced, while in the Indian corn or paddy several fine roots are produced.

You could also study the production and development of roots by germinating seeds of Indian corn or paddy—(previously soaked for a few hours) in a small box with a few sheets of damp blotting paper. Keep the paper damp and cover the box with a sheet of glass for a few days and watch results.

2. *From Cuttings.*—Place a cutting of croton in a bottle of water and observe the development of the roots. Wrap the bottle round with paper to exclude light and air in the production of roots.

3. *From Leaves.*—Take a leaf of Bryophyllum (Akapana), tie a thread to the leaf stalk and suspend the leaf, against a wall, to a nail or pin. Keep the leaf damp by sprinkling water on to it and watch for the production of roots from the margin of the leaf.

4. *From Tubers.*—Divisions of potatoes and yams containing buds develop roots.

5. *From Branches.*—If a narrow ring of bark be removed from a rose branch, and the branch be fastened down to the ground at the point where the bark is cut, then covered with earth and kept damp, roots will spring out and enter the soil.

Or if a ring of bark be removed from a shoeflower branch, and two halves of a bamboo pot be secured firmly round the part, and the pot filled with coir dust at the bottom and good soil above, roots will strike into the pot if kept damp. After a branch has been thus in the pot for some time a small notch should be cut below the pot, and the notch deepened gradually at intervals of 3 or 4 days till the branch, by now rooted, is severed and ready to form a new tree.

The production of roots on growing stems above ground you see in the Banyan (Ma-nuga), on the Vanilla (where the roots attach themselves to the bark of trees), in the pumpkin (which sends out roots from its trailing stem), in the loranthus (pilila) which fixes its roots on other trees and lives upon them, and so on. These and other peculiarities of roots you should make a point of observing in your walks through the country.

As in the case of stems, roots also act as stores of nutriment for the future use of the plant, and you are familiar with these swollen roots in the manioc (manyokka), sweet potato (batala), and radish (rabu), all of which are used as food for man.

Certain roots yield dye stuffs such as chaya root (sayamul), others are used medicinually, as, for instance, the root of the horse radish tree (murunga). The roots of cus-cus grass (sevandara) contain a fragrant otto, and sugar is prepared from the juice of the beet root.

RINDERPEST.

(Concluded.)

How to Extract the Bile.

"The animal should be laid on its left side, and the skin and flesh on the right side immediately behind the last rib cut through; the ribs are then raised, and the gall-bladder becomes visible. The gall-bladder is then punctured with a small knife or trocar, and the gall allowed to escape into a wide-mouthed bottle, previously sterilised. If properly stoppered wide-mouthed bottles are not available, then ordinary white quart bottles may be used, with a glass or enamelled funnel, which can be procured from most country stores. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operators, and also all instruments and utensils, being thoroughly cleansed and sterilised before use. The surface of the gall-bladder should also be wiped over with an antiseptic solution before being punctured.

Directions for the Selection of Biles, &c.

(*a*) Biles of all shades of colour, except those that are red from the presence of blood and thin, watery biles of a pale yellow colour, may be accepted so long as they are clear and free from sediment, and where practicable several different galls should be mixed together; this modifies and equalises the strength and safety of the gall. The selected galls should be kept separately for at least 12 hours; if any gall smells or changes

colour after keeping, it must be rejected. The good galls are then mixed together before being sent out.

(*b*) Gall is considered most effective and gives the best results when obtained from a sick beast on the 10th day after artificial inoculation, or on the 4th or 5th day after the visible symptoms have become apparent in natural infection. Earlier or later galls should be avoided, and gall taken from an animal which has died, unless the duration of the disease is known, is not to be recommended unless carefully examined.

(*c*) The gall should be used on the second day after being drawn if practicable, but if kept cool either by placing the bottles in iced chests, or wrapping them in wet cloths, and placing them in a cool draught, may be kept fresh and safe up to the third or even fourth day.

(*d*) Both before and after the gall is placed in the bottles, they should be disinfected, and also the cloths that are wrapped rouud them, before being sent to the inoculator.

(*e*) The inoculator should not extract the gall from the affected animal himself, nor come near to the infected cattle; but if it is necessary for him to do so, he should change his clothes and boots, and disinfect his hands well before commencing to inoculate, also see that everyone handling the cattle has been thoroughly disinfected.

(*f*) As it is never certain when inoculating within an infected area, that the herd is completely free from infection, the needle of the syringe should be cleaned, and disinfected in a five per cent. solution of carbolic acid or alcohol after each inoculation, and the skin of the animal at the seat of inoculation should be cleaned and disinfected both before and after the operation with Jeyes' Fluid or other similar disinfecting solution.

(*g*) The small cup or vessel containing the gall, from which the syringe is repeatedly filled, should be kept covered with a small piece of linen or calico, wrung out in the disinfecting solution, and the operator's hands and syringe should be frequently disinfected.

(*h*) As infection may be in any herd unknown to the operator, he should disinfect his hands and clothes well after inoculating each herd, and for the same reason, it is not desirable to have the same boys to assist in catching different herds of cattle.

The objections to Pure Bile Inoculations are:—

(*a*) Biles vary so much in their immunising properties, and there is no practical method of examination on the veld which will indicate whether the bile being used is strong or weak in immunising properties; hence the operator is unable to regulate the dose which he should inject, or to calculate the duration of the immunity which the inoculation will confer.

(*b*) Inoculation with pure bile does not produce its effects at once, complete immunity is not established until about the tenth day; an inoculated animal may contract a severe form of Rinderpest up to the sixth day after bile inoculation, if exposed to infection.

Further, there can be little doubt that many pure biles intensify the disease, and hasten the fatal termination in already infected animals; it is, therefore, not so suitable for the inoculation of infected herds as glycerinated bile or serum.

(*c*) Bile inoculation—either pure or glycerinated—necessitates the destruction of a large proportion of the animals to be inoculated, not less than six per cent. when the necessary care is exercised in the selection of suitable bile. In this respect it compares very unfavourably with serum.

(*d*) Lastly, pure bile will not keep. Dr Turner say:—

"In the laboratory, using minute precautions to prevent the introdution of putrefactive organisms, and by placing the fluid in an ice chest, it is sometimes possible to preserve the bile, in a state in which it can be used without danger, for a period of ten days. But usually the bile is already infected with putrefactive organisms in the gall-bladder itself, so that any amount of care is futile"; aud Veterinary Surgeon Shepherd, when referring to the formation of abscesses after bile inoculation, says "that these are not necessarily due to carelessness—I have frequently found microscopically putrefactive and other bacteria in abundance in the very best looking Koch gall."

Method of Inoculating.

"After having secured the animal to be operated on, the necessary dose of bile is injected under the skin of the dewlap by means of a hypodermic syringe, and well rubbed in. Care should be taken that the point of the needle is not inserted into the flesh, but between the shin and the flesh only. The local result of inoculation with bile is a hard, somewhat painful swelling, about the size of a man's fist, which gradually disappears in the course of a week or two.

Glycerinated Bile.

"Edington's Method is made by adding one part of glycerine to two parts of bile. The mixture should be well stirred together, and allowed to stand for eight days. Experience has taught us, however, that if urgently required, the glycerinated bile may be safely used, even for intravenous injection, forty-eight hours after being mixed. The dose of the glycerinated bile is from 15 to 35 c.c.—according to the size of the animal—injected into the cellular tissue under the loose skin of the dewlap, and well rubbed in. When used in an infected herd, large doses should be given, as it possesses distinct curative action; and in all animals which have a high temperature, indicating that the fever is already established, large doses should be injected into the jugular vein direct. It was claimed for glycerinated bile that it did not communicate the disease, as fresh pure bile was liable to do, the glycerine having the effect of destroying the active organism of Rinderpest, as well as those of putrefaction, but that it exercised no modifying action on the immunising substances contained in the bile, and although the immunity which it conferred was a passive one, this was considered an advantage rather than otherwise, as it rendered the inoculated animals susceptible to a modified reaction when injected, ten days after, with a dose of 0·1 c.c. of virulent blood. A second dose of virulent blood, of double the strength, was injected from

ten to fourteen days after the first. Unfortunately the difference in the strength and immunising properties of the different biles made it practically impossible to fix any exact dates on which to apply the blood inoculations with safety, and yet to give a reaction that would strengthen the immunity. In many herds no visible reaction followed the first blood inoculation, and yet the second blood inoculation caused such a general and severe attack, that a large percentage died of the disease. In some instances even the first blood inoculation caused a heavy mortality, clearly showing that some samples of glycerinated bile gave but a very evanescent immunity. To overcome these drawbacks, a larger dose of glycerinated bile was used, and it was followed up with blood inoculations at shorter intervals, beginning with 2 minims, and gradually increasing the dose. Several herds were immunised by this method, but it entailed a considerable amount of additional trouble and expense. Glycerinated bile is now used mainly to give a passive immunity similar to serum, until the infection in the herd, or in the near neighbourhood, has died out. If necessary it may with advantage be followed by a dose of pure bile. It is now rarely followed up by virulent blood, principally on account of the danger that exists in this country of communicating other diseases besides Rinderpest. The chief advantage of glycerinated bile over serum is that it can be prepared immediately on the outbreak of the disease, at any centre where serum is unobtainable. It will keep effective for many months—in one instance it proved effective after three years—and it requires very little skill to prepare it.

The question of defibrinated salted blood and serum as inoculating media for the prevention and cure of Rinderpest are also dealt with at length, and the pamphlet concludes with the following:—

Considerations for Future Action.

Should Rinderpest become epizootic again in South Africa, and prevail in a virulent form over wide areas of the country, rendering the cattle liable to infection, and re-infection for many months, it would be necessary to give the herds an active immunity which would last until the danger were past, and such an immunity could only be conferred by an injection of one or other of the following immunising materials:—

(*a*) Inoculation with pure bile.

(*b*) Inoculation with glycerinated bile followed by pure bile, or repeated doses of virulent blood, or

(*c*) The simultaneous inoculation with strong standardised serum and virulent blood.

There are, however, very strong objections to the use of virulent blood, whether after glycerinated bile, or along with serum,—

(*a*) Because it conveys active Rinderpest to the cattle, every inoculated herd becoming a fresh centre of infection, and

(*b*) On account of the danger of introducing other infectious diseases besides Rinderpest, such as Redwater, Anthrax, Quarter-evil, and other diseases of a similar character which affect cattle in South Africa, not yet clearly differentiated, but which are known to be communicated by blood inoculation, and which cannot always be guarded against even by careful microscopic examination.

This is also the principal objection against the use of defibrinated salted blood.

We have, however, every hope and expectation now that the war has ceased, and with it the necessity for moving cattle about in all directions for transport, and protection, that the outbreaks of the disease will be more or less sporadic, and comparatively easily suppressed by strict quarantine, and the prompt inoculation with serum or bile, both pure and glycerinated. It is upon serum, however, that our principal reliance must be placed,—

(*a*) Because it can be produced in large quantities, and kept for long periods ready for use as required. The serum prepared by Drs. Turner and Kolle at Kimberley in 1898 retained its efficacy unimpaired for two and a half years, and some of it was used effectively after three years, but its strength was evidently becoming reduced at the latter date.

(*b*) Its strength can be ascertained before it is issued for use, hence the dose can be regulated.

(*c*) Its action is immediate, a clean animal is safe as soon as it is inoculated.

(*d*) It is also curative in its action in the early stages of the disease when used in large doses.

(*e*) It does not—as far as is known at present—communicate any other disease.

The methods of inoculation which I would recommend in future sporadic outbreaks of Rinderpest are briefly as follows:—

Infected Herds.

These should be inoculated at once with either serum, glycerinated bile, or defibrinated immune blood. Every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 c.c. of strong serum, 30 c.c. of glycerinated bile, or 300 to 400 c.c. of ordinary immune blood, obtained from a recovered animal which had not been fortified. All affected animals should receive the inoculation direct into the jugular vein, as it acts more promptly and effectively than when injected under the skin. Fresh pure bile should not be used in an infected herd, if any of the other inoculating materials can be obtained, as some biles tend to intensify the character of the disease in those already infected, and its immunising effect is too slowly developed to protect the healthy cattle in the herd against infection, if they are kept in contact with the sick. If no other means are available, however, the temperature of the whole of the cattle in the infected herd should be carefully taken by clinical thermometer, and those only which register a normal temperature should be inoculated with pure bile; the others should be separated from the inoculated lot at once, and carefully attended to. If glycerine can be obtained, the spare bile should be mixed with it in the proportion of *one* of glycerine to *two* of bile. This mixture after standing for forty-eight hours, may be injected intravenously into the infected animals in large doses, not only with safety, but with marked benefit. Fresh, pure bile may, however, be used as a second injection, following serum or glyceri-

nated bile, in all animals in the herd which give no indication of being affected with the disease ; this will confer a lasting immunity sufficient for all practical purposes.

CLEAN HERDS.

When it is decided to inoculate a clean herd which is in danger of becoming infected by reason of the proximity of the disease, I would recommend that all the cattle in the herd be inoculated with not less than 20 c.c. of glycerinated bile, 30 c.c. of strong serum, or 200 c.c. of defibrinated immune blood. The strength and endurance of the immunity conferred by these inoculating materials is proportionate to the amount injected, hence, if the disease is prevalent in the neighbourhood, larger doses may be used, or an injection of fresh, pure bile may be given ten to fifteen days later. This will confer a lasting immunity on the cattle, and obviate the loss arising from the inoculation, or risk of introducing the disease.

GENERAL ITEMS.

To accustom a weak-mouthed horse to a bit, or in other words, to harden its mouth, the *Cape Agricultural Journal* says a rubber-covered snaffle is the best. If the horse is young and only just broken, it is recommended that a mouthing bit be used every day till he gets used to the feel of it, and if he is to be driven a rubber-covered bit should be used.

Nutrient qualities of fruit vary considerably with the nature of the fruit ; such as banana, fig, date, and grape ranking very highly: one pound of bananas is said to contain as much nourishment as half a pound of meat, and in their own indigenous country, Uganda, they are converted into jam, champagne, beer, vinegar, and brandy. The date also contains a large percentage of nutrient material, and the native of the country to which it is indigenous not only feeds himself on it, but gives it to his horse and camel. Figs also are most wholesome and nutritious—grapes especially so. Apples are good for liver, brain, and throat complaints ; oranges are nourishing, and have a slight tonic influence on the liver, while the lemon is a popular remedy for rheumatism, and has no equal in the treatment of skin diseases—it is not only curative but preventive in the latter. The constituents of fruits are sugar, acids (either citric, phosphoric, malic, or tartaric), distilled water, and a small percentage of fat and albumen. Important among the uses of fruits may be noted their diuretic and laxative effect, and the influence they exert upon the disease germs which may be in the system.

The proper distance to plant mango trees, says the *Queensland Agricultural Journal*, is 35 feet each way ; oranges and lemons 30 feet. Any small crops may be planted between the trees for the first few seasons, provided deep cultivation and manuring are followed. This will keep your orchard on the "improve" all the while.

The same paper refers to two methods of curing chillies :—(1.) When the chillies are ripening, go over the field once a week, picking all the ripe ones. Leave a long stem on the pod. Expose the pods to the sun for a day or two to toughen the skins and stems. Then with a long, slim needle string them through the stem on strong twine 8 or 9 feet long. When the twine is full, hang it up in a dry cool shed where there is plenty of ventilation. Be careful not to string any poor or damaged pods. When dry, store them in a dry cool room, hanging them on poles or nails. (2.) Another, and a good plan, if the chillies are to be exported, is one which we know by experience to be good, as we have kept them for 12 months without their changing colour or strength. Make a fairly strong brine. Fill a stone jar or a keg with the chillies, and pour the cold brine over them, filling the vessel to the top. Bung down closely. In 2 or 3 months, or even after a longer interval, either strain the brine or make fresh, carefully washing out the vessel. They will keep fresh for a long period.